the OIL AND GAS JOURNAL

JANUARY 28, 1957

Annual REVIEW and FORECAST Number

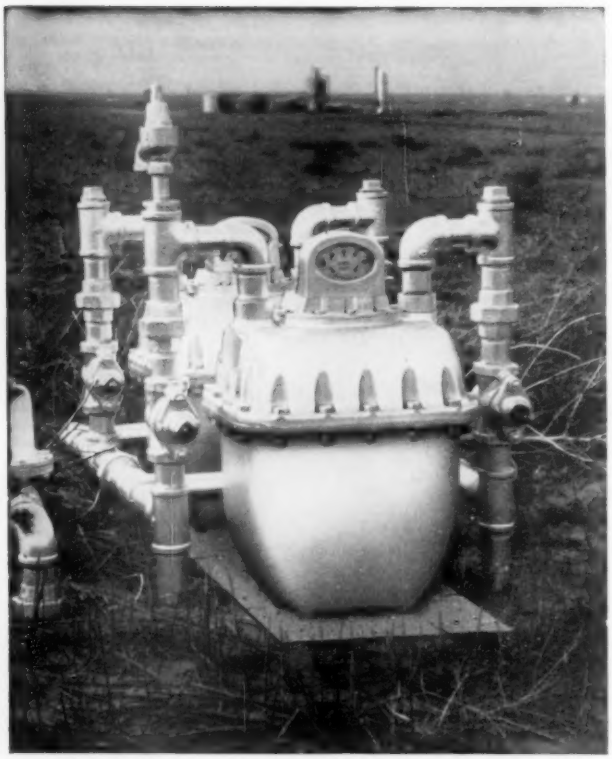
Crude demand will go up---

ore wells will go down

Refinery runs soar still highe

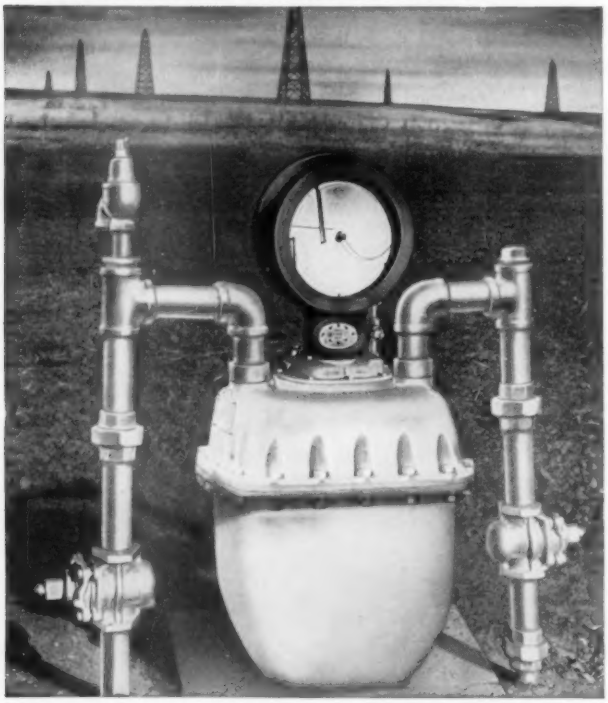
Details.... Page 139

How Small Refiner Uses Computer to Stay Competitive • p. 126



(ABOVE) Installation of two Rockwell "800" meters in West Texas field with manifold controlled by Rockwell-Nordstrom valves.

(BELOW) Rockwell "800" meter with Combined Record Gauge measuring 75 lb gas in Kansas field. The valves are Rockwell-Nordstrom.



Recommended installation is off the ground and away from alkaline soil.

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at up to 100 lb. working pressure

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- **PIPE LINE TAPS**
- **FIELD PROCESSING**
- **IRRIGATION FUEL SERVICE**

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ROCKWELL "800" Aluminum GAS METER

A Glance Ahead

- **New refining construction** won't account for all the increases this year in basic crude capacity and other processing capacities. Bottleneck removal undertaken by refinery staffs will play a big part.

  Refiners are looking with interest, for example, at the newer perforated fractionation trays. Some of these can add substantially to throughput when substituted for bubble trays in conventional columns. One refiner jumped basic crude capacity from 20,000 to 30,000 bbl. per stream day by this relatively simple expedient.

- **U. S. firms are paying** through the nose for some foreign pipe. They find premiums stiff when they are forced by immediate construction needs to get pipe at any price. One German mill is exacting a premium of 40 cents a foot for 6-in. Buyers are subject also to a $10 per ton escalation between order and delivery dates if the mill sees fit to impose it.

- **Kansas operators will escape a severance tax** if the legislature adopts the initial program offered by Governor Docking.

  Additional revenue would come from retention of sales taxes now going to counties and cities, extending the sales tax to cover more businesses, and raising corporate income tax rates from 2 to 4 per cent.

  However, pressure will be applied by farm and other groups to impose a 3 per cent severance tax to solve Kansas' money problems. And the governor did not rule out the possibility. He simply made no recommendation one way or the other in his opening message to the legislature. Kansas producers argue that the personal property tax which they already pay is equivalent to roughly 4 per cent of gross production.

- **Pipeline companies** which are turning to lighter pipe as a means of beating the soaring costs of steel report some trouble in getting quotations. Their complaint: The steel mills are interested only in tonnage, and can have things their way in the present sellers' market.

- **An increase in Rocky Mountain drilling** is due this year. It will not, however, be general. Areas of greatest activity: Williston basin, Central Montana, western Nebraska, Four Corners, the western slopes of Colorado, and southeastern Colorado. Hottest area should be Williston, with the Paradox basin running close behind.

- **Changes are coming** in basic requirements for petrochemicals. Demand will keep picking up for the old workhorses—natural gas, propane, butane, and other light fractions. But other components are due to enter the picture more and more. The basic aromatics, higher aromatics, olefins of many types, and residual fuel oil are going to pick up steam as new processes are put to commercial use.

- **Pipeline transportation of L.P.G.** will be stepped up this year. Conversion projects in the Gulf Coast area will continue. And a project soon to be announced will extend L.P.G. pipeline movement from Oklahoma into Michigan. A 170-mile, 6-in. line is planned from East Chicago to Lowell, Mich. The relatively low value of L.P.G., plus the high cost of aboveground storage, has held back pipeline construction. But competition may force marketers now relying on tank cars for long-distance hauls into pipelining.

the OIL AND GAS JOURNAL

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ANNUAL REVIEW-FORECAST

Summary and Outlook . . . 139

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Wildcat drilling will be up 4.7 per cent and total footage will gain 3.8 per cent.

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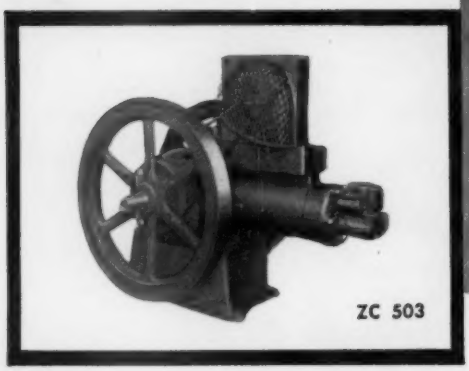
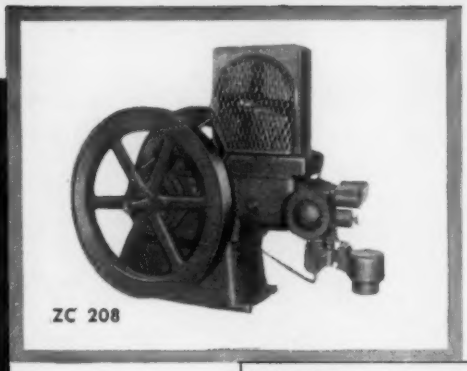

ZC 503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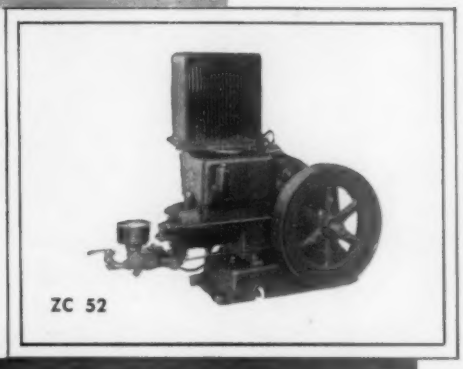
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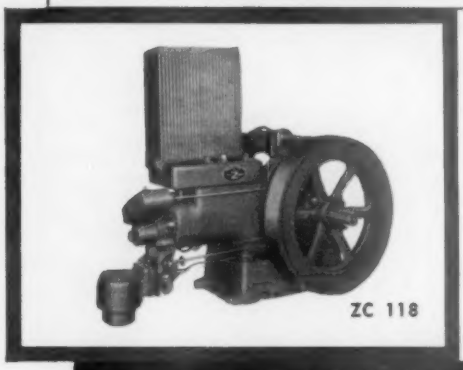
pick a "ZC" that best fits your pumping unit!

The broad Fairbanks-Morse "ZC" line has an engine that will best fit your pumping unit . . . from 3 to 30 hp. They're economical and easy to maintain—simply designed with no complicated parts or delicate adjustments.

All "ZC" sizes are high displacement, heavy-duty, slow-speed models—ideal for oil field pumping service! And, all sizes have the famous extra-heavy double flywheel for symmetry and perfect balance . . . with power take-off on either side of the engine.

See your local supply store about the "ZC" line . . . or write Fairbanks, Morse & Co., Chicago 5, Illinois.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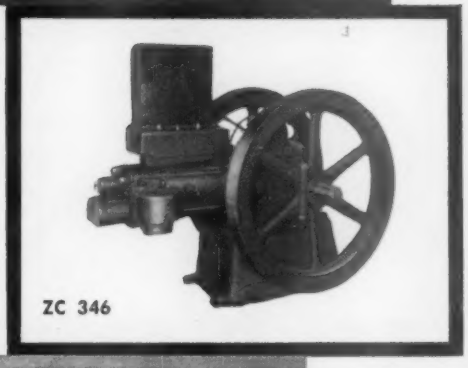
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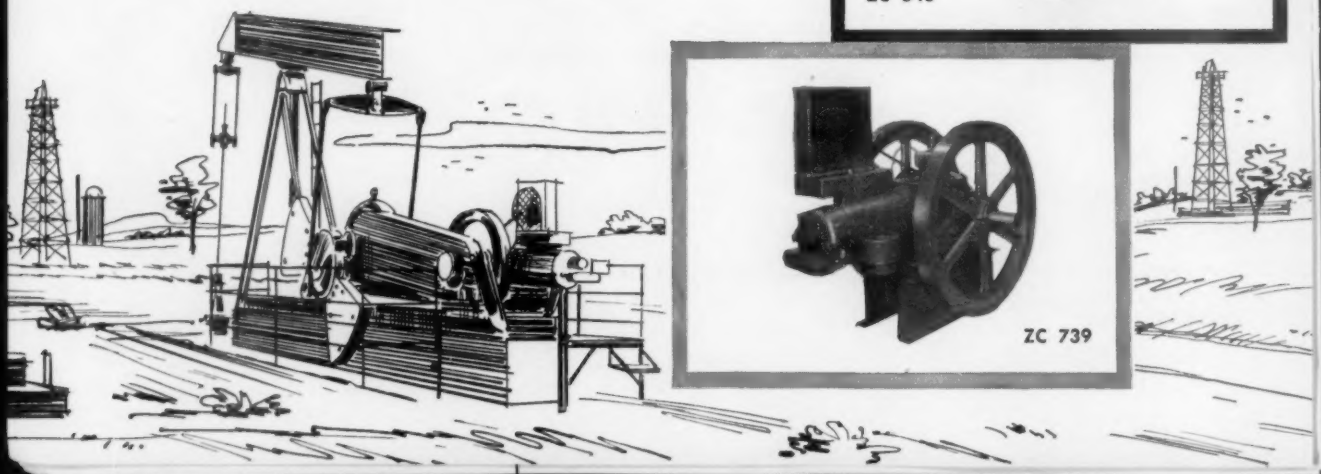
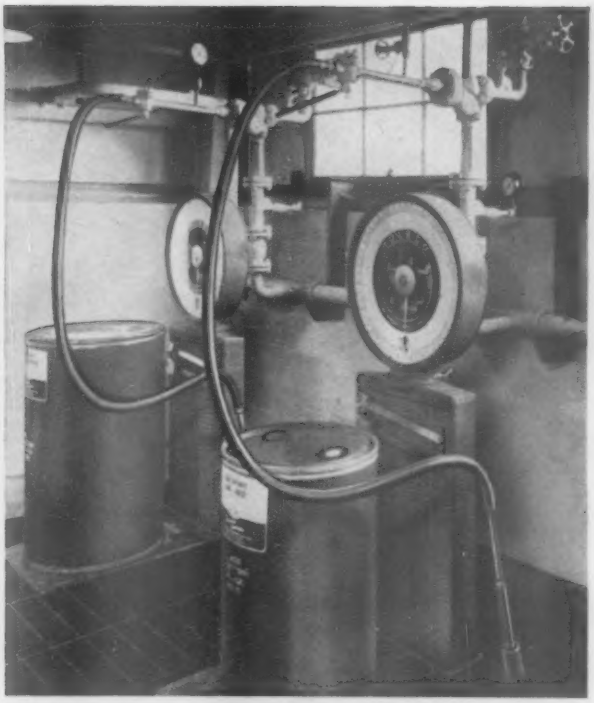
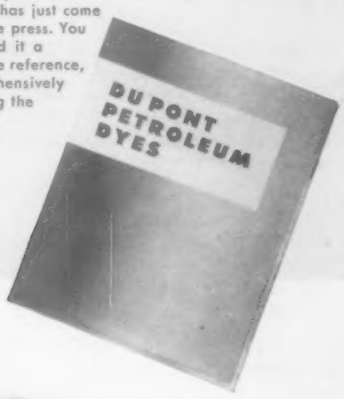




NEW DU PONT dye drumhead has an opening through which new probe can be readily inserted and manipulated. The two developments increase efficiency, save both time and money and eliminate dusting in the dry-dye eduction process.

This is a close-up view of special opening which accommodates dry-dye eduction probe. Opening can be resealed with standard 2-inch pipe cap.

THIS BOOK on Du Pont petroleum dyeing has just come from the press. You will find it a valuable reference, comprehensively covering the subject.



Here are two more big reasons to use Du Pont dyes

New probe: Only six months ago Du Pont introduced an eduction probe of revolutionary design. It greatly facilitated the dry-dye eduction process, and solved the problem of clogging.

Now the same engineers who developed the probe have developed a new drumhead, also radically different from the conventional type, reducing dusting to an absolute minimum.

New drumhead: The drumhead, though removable, need never be taken off. It has a 2-inch circular opening just large enough for insertion of the probe. The small plastic disc sealing the opening can be easily removed with a pocketknife.

The drumhead opening is rimmed with plastic which is threaded to accommodate a standard 2-inch pipe plug. That means easy resealing to protect the quality which is built into all Du Pont dyes.

Petroleum dye book: A comprehensive book on the whole petroleum-dyeing subject has just been printed. It includes solubility charts, spectrophotometer curves, data on latest dyeing methods, and the use of the new probe and drumhead described above. Copies of the book, "Du Pont Petroleum Dyes," may be obtained from any of the sales offices listed below.

Product quality: Du Pont petroleum dyes are popular throughout the industry because of their outstanding qualities . . . uniformity, stability, solubility, purity and strength. Colors include red, yellow, blue, orange and bronze. These can be combined to produce other colors.

All Du Pont dyes have been proved to give excellent results in greases, motor and heating oils, jet and diesel fuels—as well as in gasoline where they have been most widely used.

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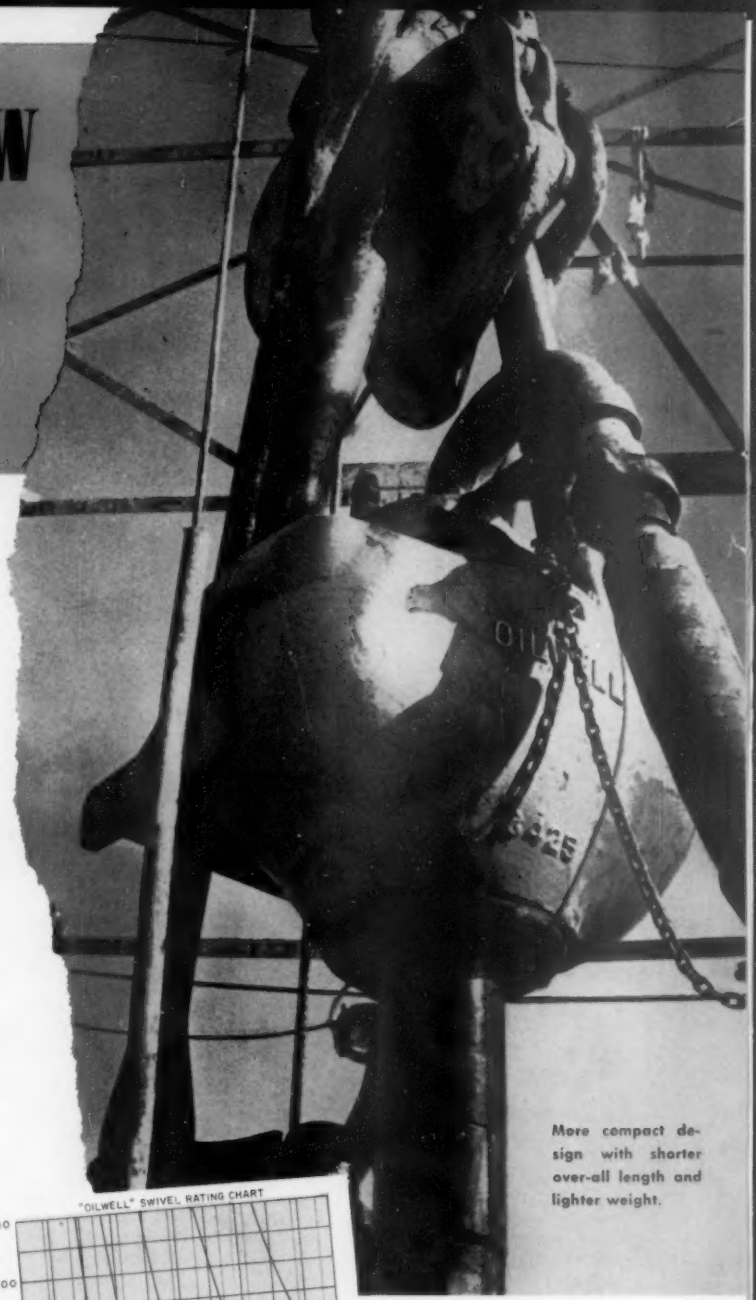
"Oilwell's" New Swivel Line

...gives you higher ratings under A.P.I. standards



More compact design with shorter over-all length and lighter weight.

IN DESIGNING this new line of "Oilwell" swivels, rating increases which range from about 12½% up to 50% have been made on four of our five sizes under the new A.P.I. standards.

Improvements Include . . .

1. New type streamlined housing has stronger bail connections with removable pins which simplify bail replacement. Over-all widths are also reduced.
2. Heat-treated forged steel body with box threading and heat-treated forged alloy-steel removable subs with double pin . . . increases body strength, yet reduces weight by some 15%-20%, depending upon the swivel model.
3. Large diameter fluid passages which reduce pressure losses are provided on all sizes.
4. Wash pipe arrangement on all models is redesigned for easier packing installation.

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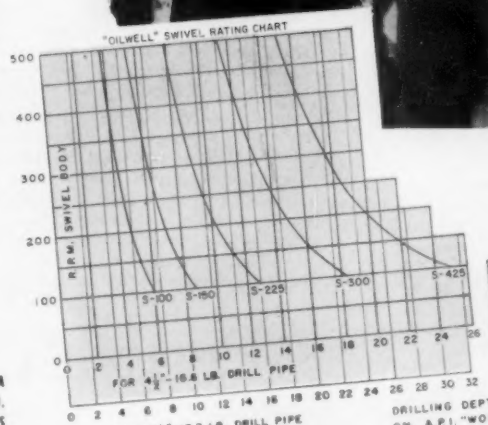
. . . such as (a) wide-spaced auxiliary and radial bearings to provide maximum steadying effect for the heavy-duty, full-apex roller main bearing; (b) wash pipe lined and armoured with abrasion-resisting DI-HARD; (c) grease-lubricated, pressure-sealing wash-pipe packing; (d) spring-loaded oil seals and (e) long-radius, heat-treated goose-neck with extra outside wall thickness to compensate for fluid cutting action.

Your local "Oilwell" Representative will give you detailed information.



SWIVEL TYPE	API "WORKING-LOAD STRENGTH RATING" IN LBS
S-100	200,000
S-150	300,000
S-225	450,000
S-300	600,000
S-425	850,000

DRILLING DEPTH IN 1000S OF FEET BASED ON A.P.I. "WORKING-LOAD BEARING RATING"

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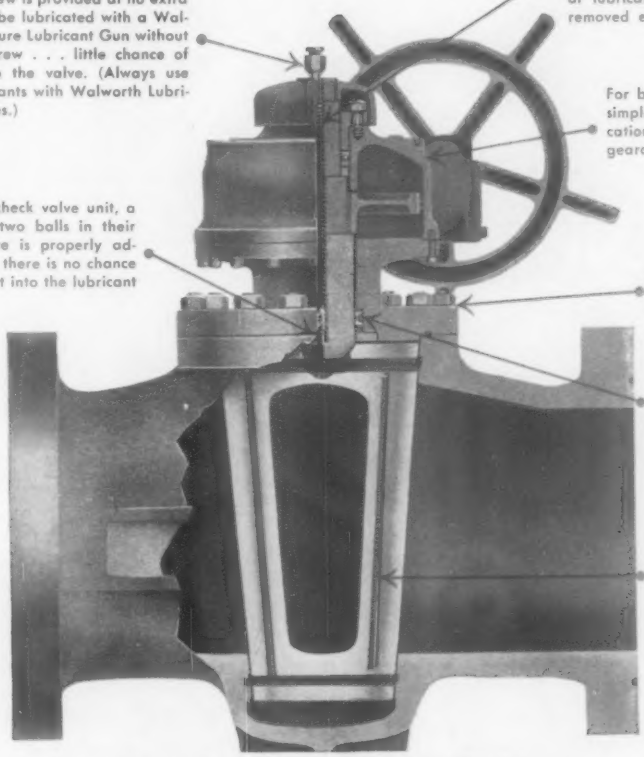
Combination button-head lubricant fitting and lubricant screw is provided at no extra cost. Valves can be lubricated with a Walworth High Pressure Lubricant Gun without removing the screw . . . little chance of grit getting into the valve. (Always use Walworth Lubricants with Walworth Lubricated Plug Valves.)

An added safety feature in the form of a groove cut part way up side of the lubricant-fitting screw allows the operator to observe any tendency of lubricant to blow out before the screw is removed entirely.

For buried pipelines — yoke design permits simple attachment of handwheel and lubrication extensions without modifying the gearcase.

In the stainless steel check valve unit, a transverse pin holds two balls in their seats. When the valve is properly adjusted and lubricated, there is no chance for line pressure to get into the lubricant system.

Standard bolt threads, rather than fine threads, mean easy replacement of nuts and bolts from local stocks.



Two overlapping Teflon packing rings form an effective seal against possible leakage without "grabbing" the plug shank. Low breakout torque . . . plug turns easier. Packing serves only as a seal and is not used to hold the plug in its seat.

Lubricant grooves completely frame the port openings and encircle the plug at the top and bottom assuring a tight seal against leaks. Bottom circumferential groove is separate from, but connected with, the lubricant well.

Other Walworth Lubricated Plug Valves include Single Gland and Regular Gland types. Sizes to 30 inches. Pressures to 5000 psi. and for vacuum service.

Cutaway of a 24-inch Walworth Lubricated Plug Valve

Without exception, a Walworth Ball Bearing Lubricated Plug Valve is easier to operate and maintain than any other type of rotary-action, sealed valve available today for pipeline service. Design features pointed out here show just a few advantages of Walworth Ball Bearing Lubricated Plug Valves.

Many pipeline companies throughout the world use Walworth valves for handling gas, crude, and finished products. Investigate the line of Walworth valves for your own needs. See your Walworth Distributor, or write for literature: Walworth Company, General Offices, 60 East 42nd Street, New York 17, N. Y.

Use pigs or scrapers?

Walworth Type 49 Cast Steel Gate Valves are designed on the throughport principle to permit passage of pigs and scrapers — may be installed without regard to flow direction. Sizes 2 to 30 inches inclusive. Ask for literature.

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Tretolite Desalting prevents salts, solids, trace metals and other impurities from entering the refinery stream. It prevents salt plugging and fouling in condensers, exchangers and towers, reducing clean-outs and tube rattling to minimum. Tretolite Desalting is an automatic, all-chemical process that consistently delivers salt removals in the 98% to 100% range.

2 *EFFICIENT CORROSION PREVENTION with Kontol Corrosion Inhibitors*

Kontol Corrosion Inhibitors prevent internal corrosion and hydrogen blistering and help to eliminate scale and fouling difficulties. Kontols are readily adsorbed from hydrocarbon solutions at metal surfaces to form a tough impervious film. In addition to their inhibiting properties, the Kontols are powerful detergents which clean and de-foul refinery equipment.

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AR-57-1

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MAN-MADE BLIZZARD

For Blanketing Fire in Chemicals, Gasoline, Oils

These pictures were taken at Robins Air Force Base in Georgia during acceptance tests of a Grinnell ProtectoFoam System. Above, a man slogs through foam to check the spray pattern produced by over 800 nozzles discharging 75,000 gallons of foam per minute.

With a ProtectoFoam system, a vapor tight blanket of foam floats on liquids and clings to solids, extinguishing flames and preventing re-ignition. It is particularly effective against fires in gasoline, oils, and chemicals.

The foam, a harmless mixture of water and a protein base foaming agent, is produced mechanically by special Grinnell nozzles. When the foam compound has been used up or shut off, these nozzles then discharge water in the same manner as standard open sprinklers. Once the fire is out, the water discharge may be used to wash down the building and equipment and clean away the foam.

ProtectoFoam is only one of many Grinnell Fire Protection Systems designed for special hazard application. For unbiased advice on your fire protection problems, write to Grinnell Company, Inc., 256 West Exchange Street, Providence, Rhode Island.

Foam flows under aircraft to form a complete blanket.

Truck breasts hub-deep foam blanket outside hangar. Foam will dry out and disintegrate to a powder.

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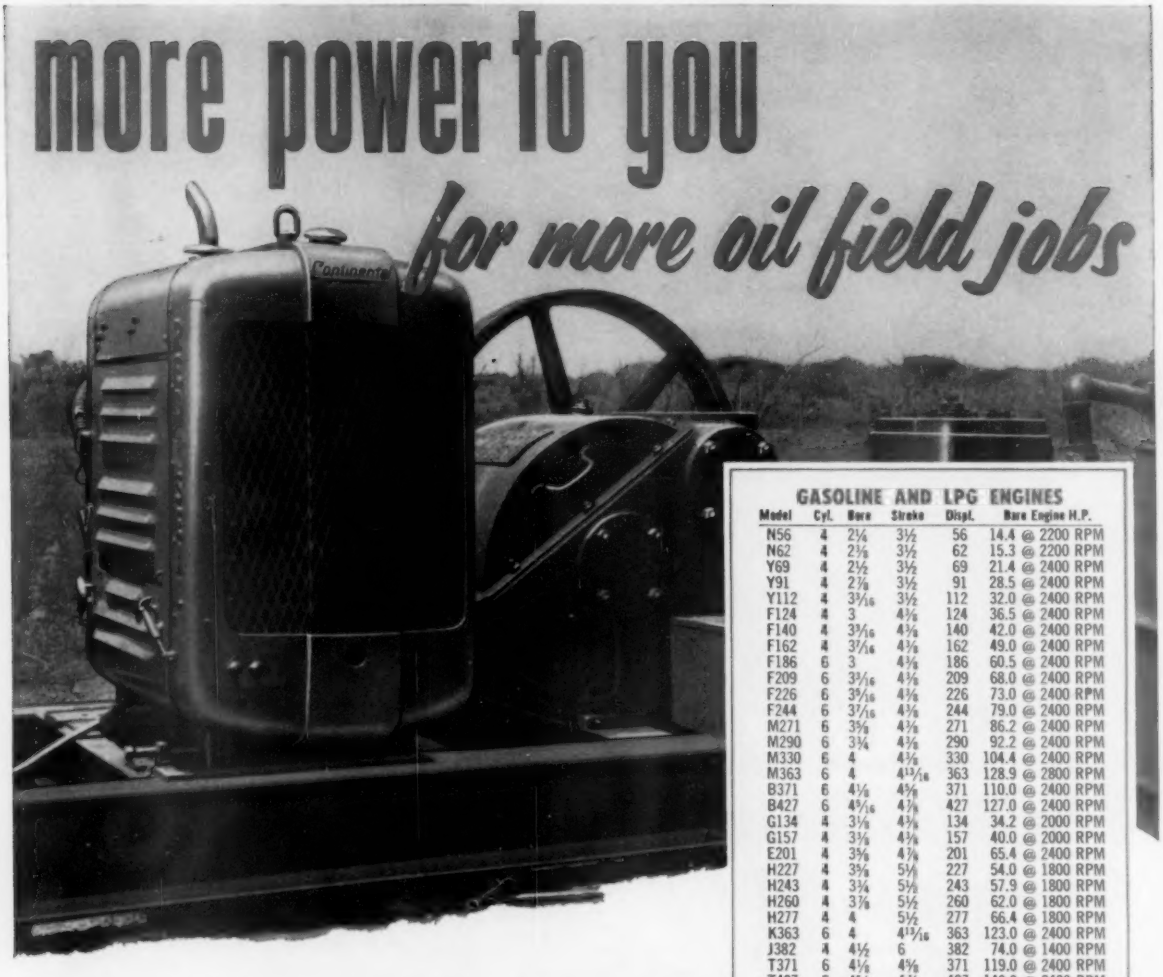

All through the oil fields, you'll find abundant proof of the stamina that has made Continentals first choice for so many tough jobs. This Red Seal Model F-162 closed power unit, driving 4 x 6 Dean pump, furnishing water for a 6,500-foot drilling rig in Stonewall County, Texas, replaced another Red Seal which had been in service continuously for eight years. There are Red Seals engineered for every oil field application, at closely-spaced power levels, and available for use on all standard fuels. Ask your oil field supply store or get in touch with the nearest Continental Office.

• • •

GASOLINE AND LPG ENGINES

Model	Cyl.	Bore	Stroke	Displ.	Bare Engine H.P.
N56	4	2¼	3½	56	14.4 @ 2200 RPM
N62	4	2⅜	3½	62	15.3 @ 2200 RPM
Y69	4	2½	3½	69	21.4 @ 2400 RPM
Y91	4	2⅞	3½	91	28.5 @ 2400 RPM
Y112	4	3 3/16	3½	112	32.0 @ 2400 RPM
F124	4	3	4⅛	124	36.5 @ 2400 RPM
F140	4	3 3/16	4⅛	140	42.0 @ 2400 RPM
F162	4	3 7/16	4⅛	162	49.0 @ 2400 RPM
F186	6	3	4⅛	186	60.5 @ 2400 RPM
F209	6	3 3/16	4⅛	209	68.0 @ 2400 RPM
F226	6	3 5/16	4⅛	226	73.0 @ 2400 RPM
F244	6	3 7/16	4⅛	244	79.0 @ 2400 RPM
M271	6	3⅝	4⅛	271	86.2 @ 2400 RPM
M290	6	3¼	4½	290	92.2 @ 2400 RPM
M330	6	4	4½	330	104.4 @ 2400 RPM
M363	6	4	4 13/16	363	128.9 @ 2800 RPM
B371	6	4⅛	4⅝	371	110.0 @ 2400 RPM
B427	6	4 5/16	4⅞	427	127.0 @ 2400 RPM
G134	4	3⅛	4⅜	134	34.2 @ 2000 RPM
G157	4	3⅛	4⅜	157	40.0 @ 2000 RPM
E201	4	3⅝	4⅞	201	65.4 @ 2400 RPM
H227	4	3⅝	5½	227	54.0 @ 1800 RPM
H243	4	3¼	5½	243	57.9 @ 1800 RPM
H260	4	3⅜	5½	260	62.0 @ 1800 RPM
H277	4	4	5½	277	66.4 @ 1800 RPM
K363	6	4	4 13/16	363	123.0 @ 2400 RPM
J382	4	4½	6	382	74.0 @ 1400 RPM
T371	6	4⅛	4⅝	371	119.0 @ 2400 RPM
T427	6	4 5/16	4⅞	427	140.0 @ 2400 RPM
U501	6	4½	5¼	501	159.0 @ 2400 RPM
R513	6	4½	5⅛	513	164.3 @ 2400 RPM
R572	6	4¼	5½	572	182.4 @ 2400 RPM
R602	6	4⅜	5½	602	191.7 @ 2400 RPM
V603	8	4¼	4¼	603	220.0 @ 2800 RPM
S749	6	5⅛	5½	749	217.0 @ 2200 RPM
S820	6	5⅛	5½	820	237.0 @ 2200 RPM

CUSHIONED POWER DIESEL ENGINES

Model	Cyl.	Bore	Stroke	Displ.	Bare Engine H.P.
ZD129	4	3¼	3⅞	129	34.0 @ 2000 RPM
GD157	4	3⅛	4⅜	157	39.0 @ 2000 RPM
*ED201	4	3⅝	4⅞	201	45.8 @ 2000 RPM
HD243	4	3¼	5½	243	55.0 @ 2000 RPM
*HD260	4	3⅜	5½	260	59.0 @ 2000 RPM
*HD277	4	4	5½	277	63.2 @ 2200 RPM
*JD382	4	4½	6	382	72.5 @ 1600 RPM
TD427	6	4 5/16	4⅞	427	106.0 @ 2000 RPM
RD572	6	4¼	5⅛	572	154.0 @ 2000 RPM
VD603	8	4¼	4¼	603	175.0 @ 2600 RPM
SD802	6	5 5/16	5½	802	202.0 @ 1800 RPM

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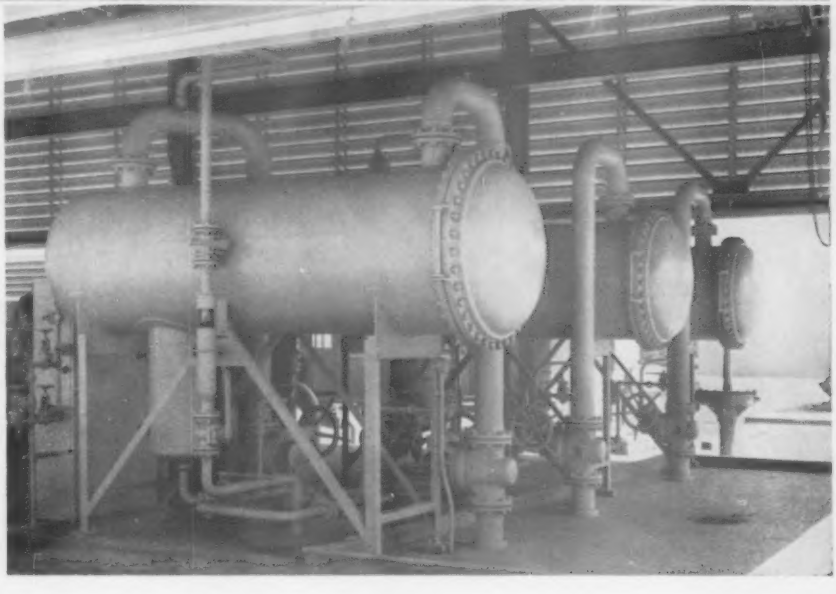

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THE
LQ600
VALVE

FIG. LQ600-200
200 lb. S.P.—400 lb. W.O.G.
550° F.

FIG. LQ600-150
150 lb. S.P.—300 lb. W.O.G.

¼ to 2 inches

Thousands of these valves have served for as long as five years without replacement, regrinding, maintenance, or leakage—even on the most severe services. Their patented Brinalloy* seats and discs are more resistant to wear and corrosion than 500 Brinell Stainless Steel . . . even outlast case-hardened Stainless Steel exceeding 1000 Brinell. LQ600 Valves practically eliminate maintenance costs!

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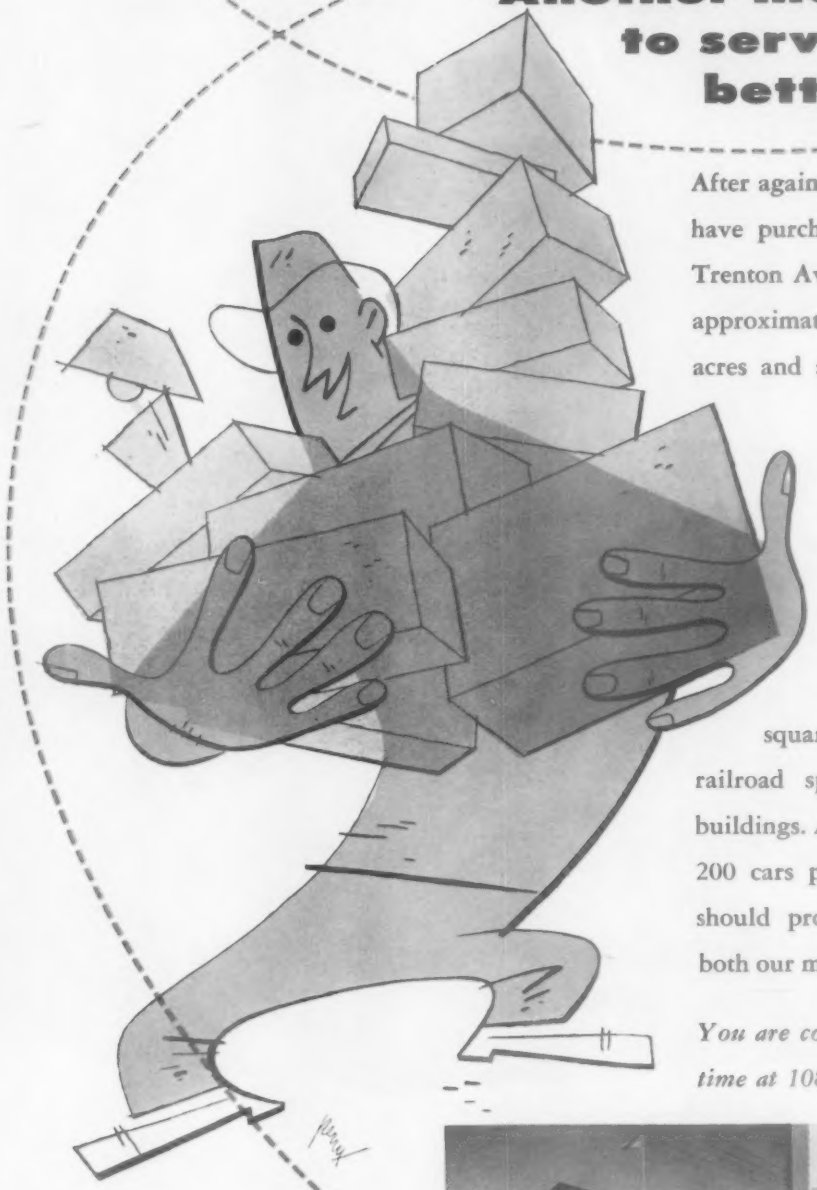

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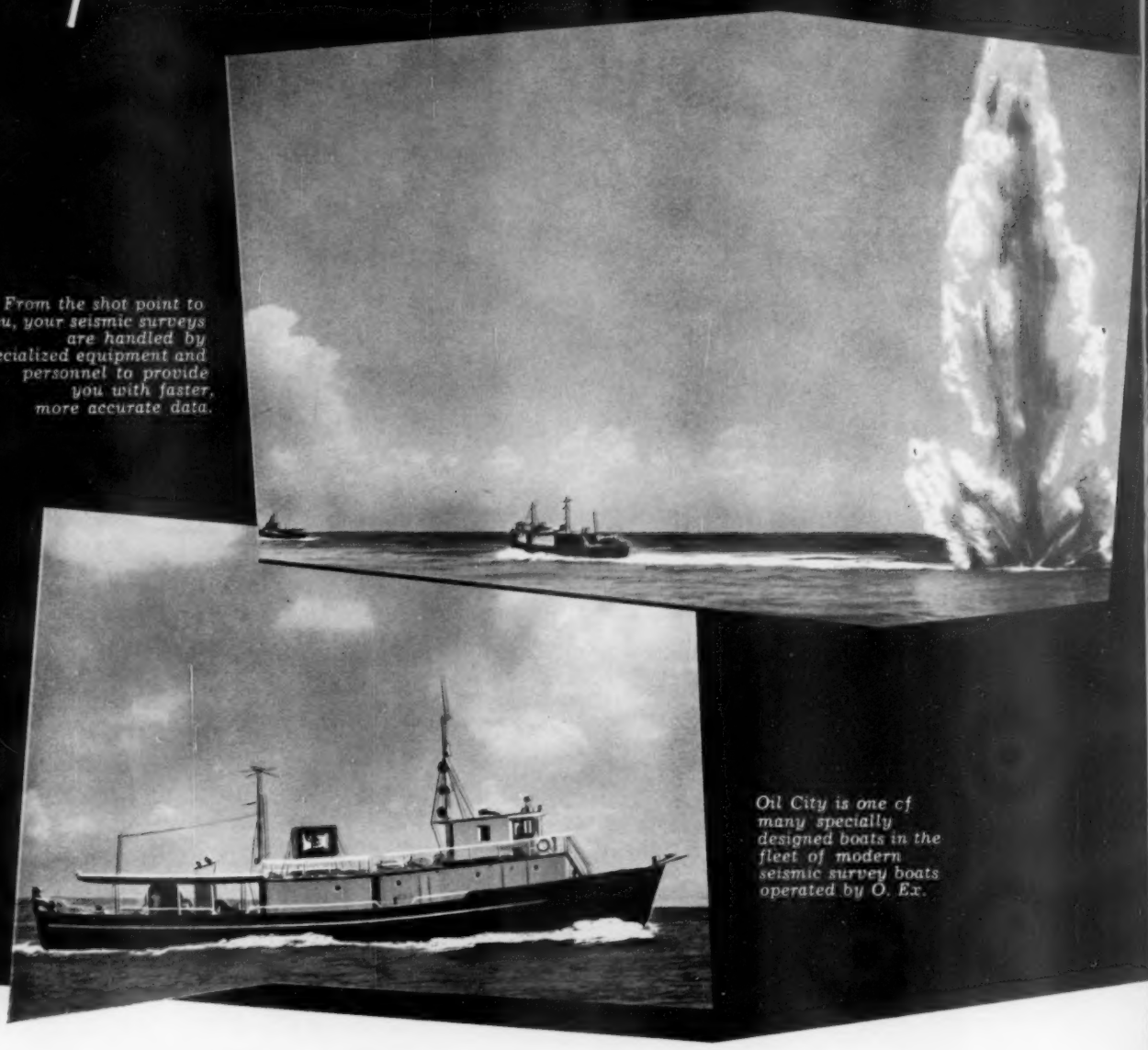

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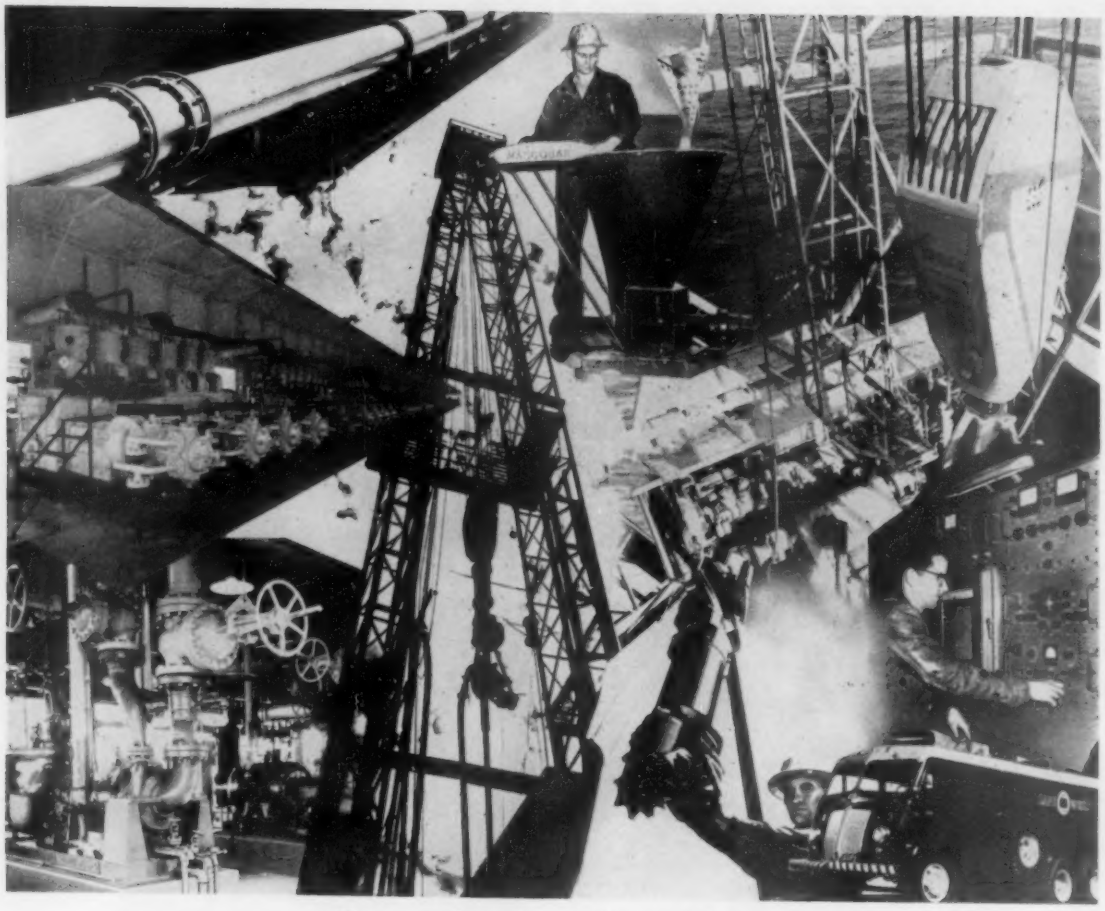

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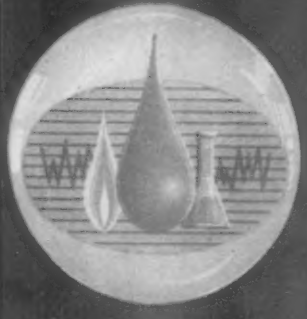

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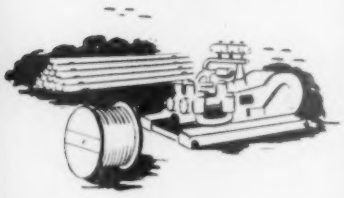

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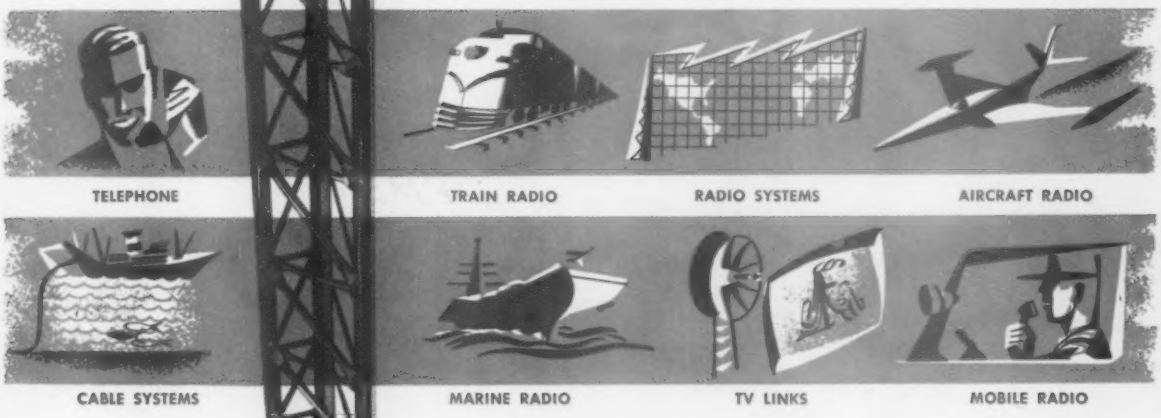

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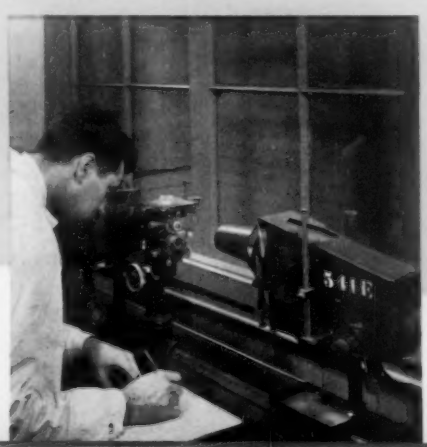

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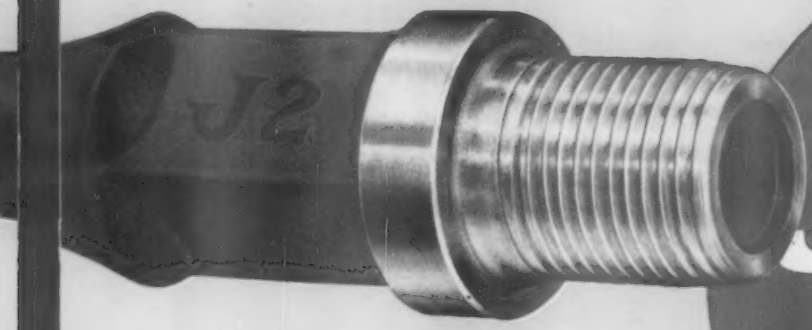

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Type	Identification	USE	DESCRIPTION	PHYSICAL PROPERTIES					
				Yield 1000 psi	Ultimate 1000 psi	% Elong. in 8"	% Red. of Area	Izod	Brinell Hardness
J-12	Protector ends painted BLUE	For heavy pumping loads under all conditions	Made from processed electric furnace steel with high yield strength and excellent fatigue resistance.	95-105	110-125	12-17	65-75	90-110	229-269
J-8	Protector ends painted BLACK	For extremely heavy pumping loads	A special alloy steel of exceptional yield strength and well-balanced physical properties.	100-115	120-135	10-15	50-60	65-85	240-269
J-7	Protector ends painted ORANGE	For medium to heavy pumping loads under all conditions	Called "standard of the industry". Strong, corrosion resistant nickle molybdenum steel, fully normalized, tempered, descaled and shot peened for further fatigue and corrosion resistance.	65-80	85-100	14-22	60-70	90-107	170-210
J-2	Protector ends painted WHITE	For medium to heavy pumping loads in non-corrosive fluids	High grade carbon manganese steel, fully normalized, descaled and shot peened to add strength and endurance.	60-75	90-105	18-24	60-70	60-90	160-210

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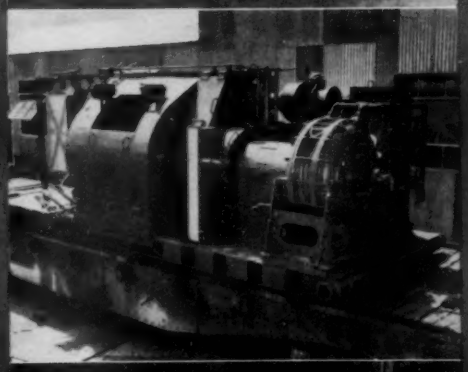
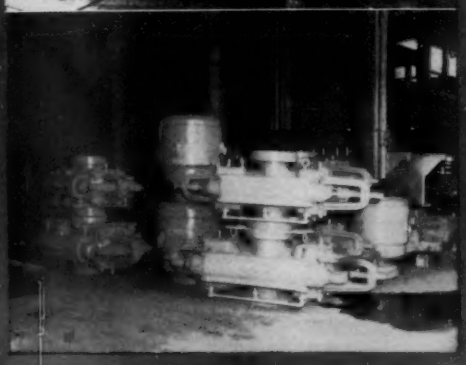
what AVONDALE'S O.T.* means to the Oil Man





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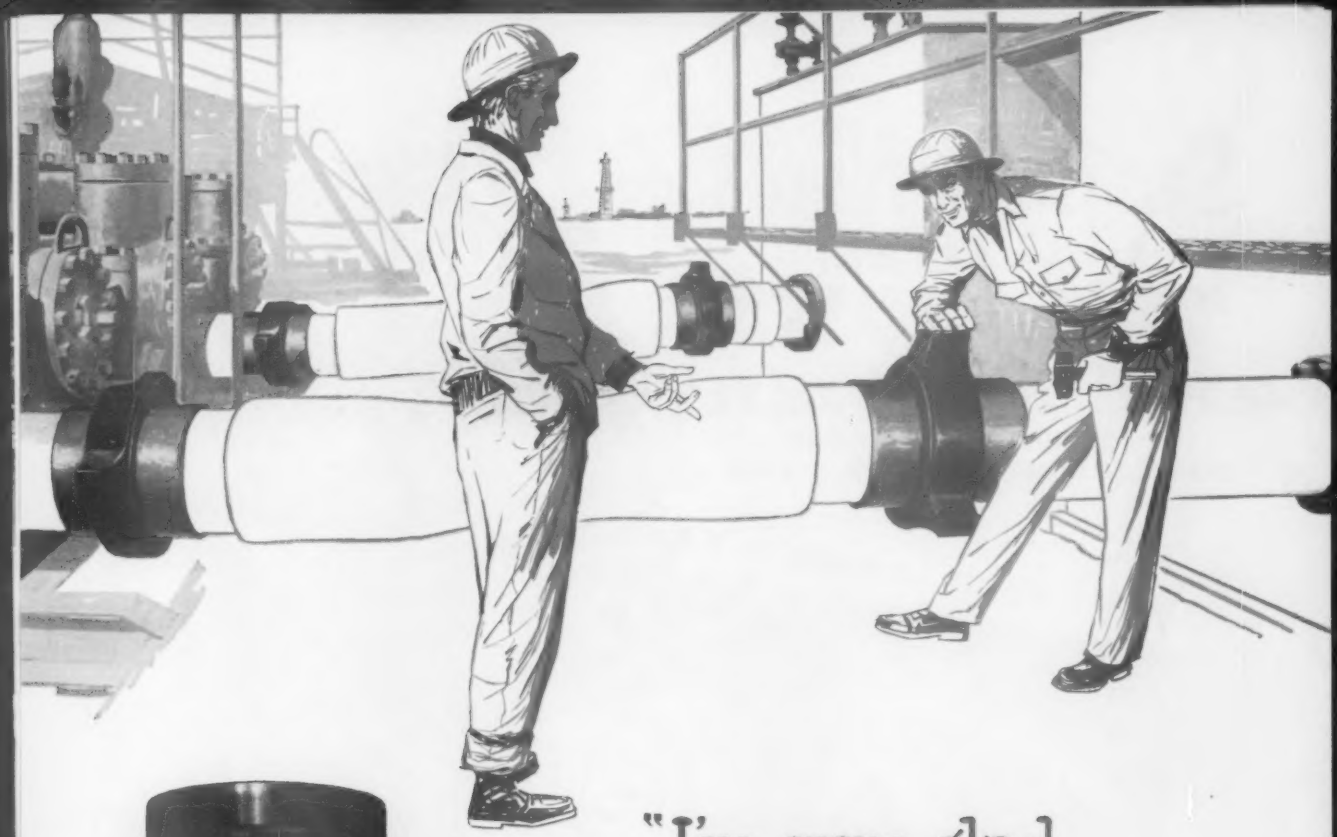

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MOST WANTED — that's right — because the G P line includes gate, globe, and angle type valves having seats faced with **HAYNES STELLITE*** alloy or other hard facing alloys for greater seat-wear resistance . . . at no extra cost!

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Get longer, drop-tight, service life with minimum maintenance by specifying Vogt G P Valves. Available in a complete range of sizes from ¼" to 2" and rated 800 pounds at 850°F. and 2000 pounds at 100°F.

HENRY VOGT MACHINE CO.
P. O. Box 1918—Louisville 1, Ky.

SALES OFFICES: New York, Chicago, Cleveland, Dallas, Philadelphia, St. Louis, Charleston, W. Va., Cincinnati, San Francisco

Vogt

GENERAL GP PURPOSE

Vogt FOR BETTER VALVES

DROP FORGED STEEL

VALVES

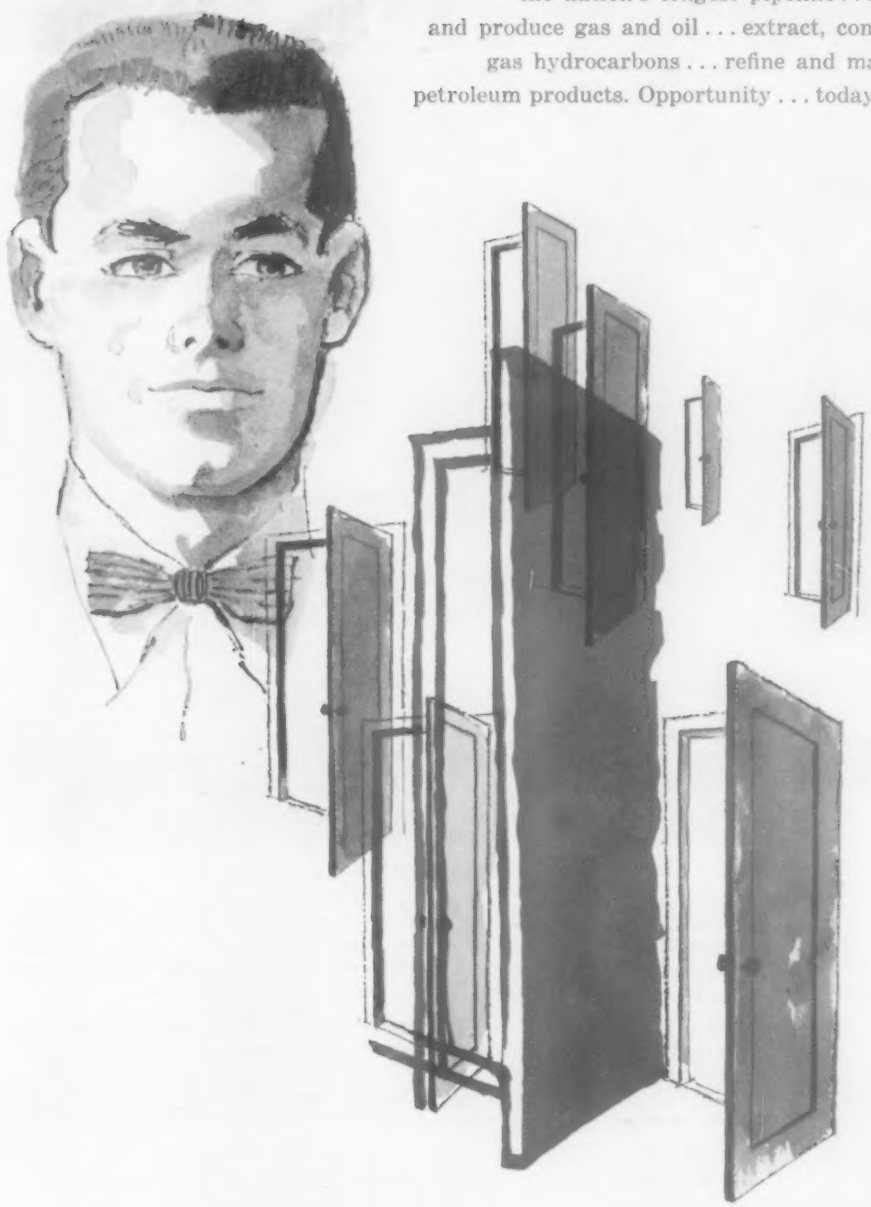
*Trade-Mark of Union Carbide and Carbon Corporation

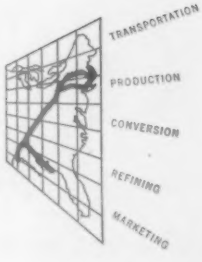
MORE DOORS OPENING

Better education, many more opportunities, finer jobs. Today's youngsters enjoy advantages unknown to past generations.

Gas and oil alone open many doors. Ours among them.

We not only transport natural gas through the nation's longest pipeline . . . we explore for and produce gas and oil . . . extract, convert natural gas hydrocarbons . . . refine and market petroleum products. Opportunity . . . today and tomorrow.





TENNESSEE GAS TRANSMISSION COMPANY

AMERICA'S LEADING TRANSPORTER OF NATURAL GAS

HOUSTON, TEXAS

New speed for the road— no job too rugged for FWD

When you pick a heavy-duty truck for today's oil operations you need a combination of speed and driving power—speed for increased highway travel and driving power for rugged off-highway hauling that is always a part of oilfield operations.

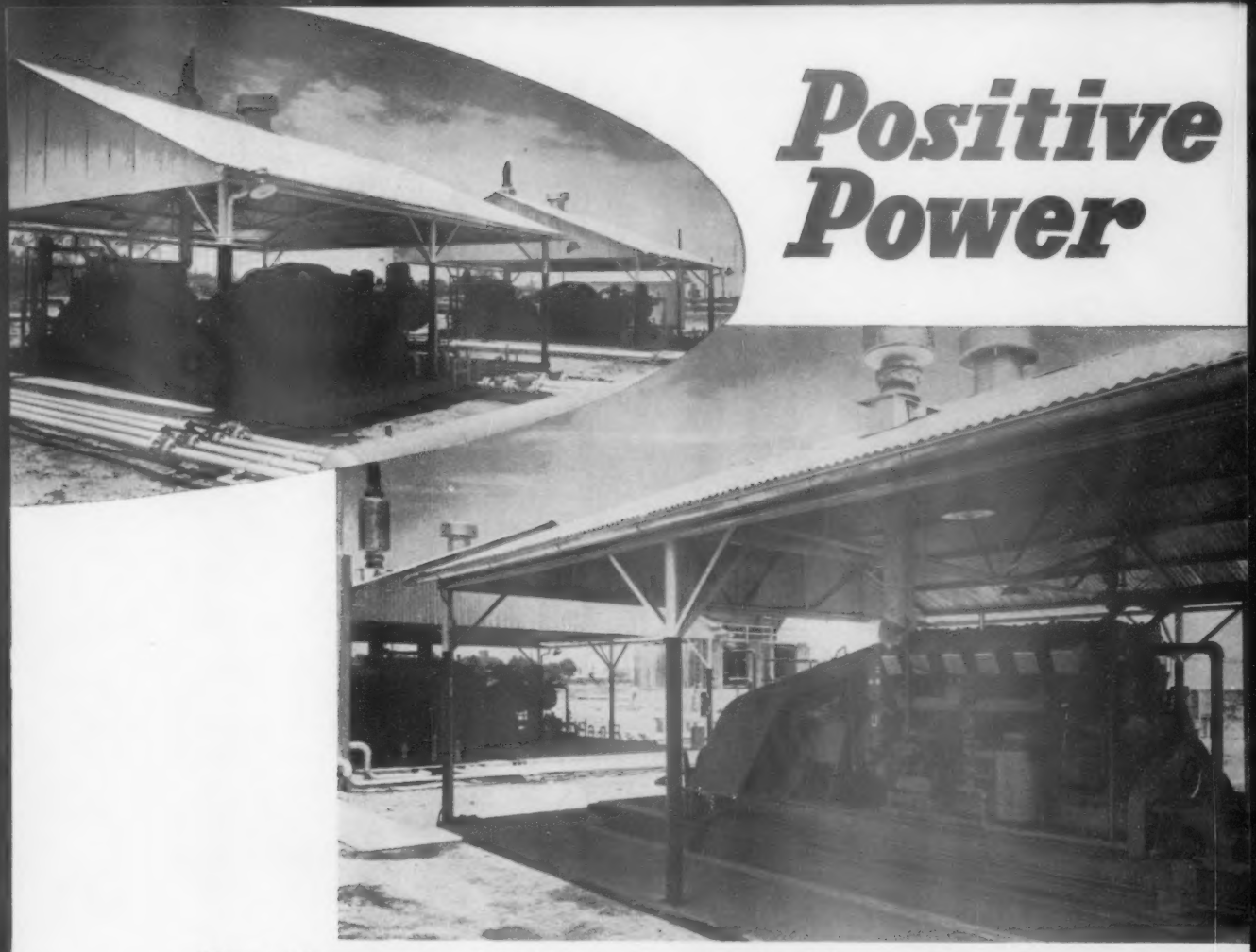
Today's big new line of FWDs is, more than ever, built for oil! The exclusive FWD power and weight proportioning; four or six wheel drive with the powered front axle; new engines with road speeds up to 65 MPH, with parts and service available anywhere . . . These are the features that give FWD versatility that takes oil jobs as they come!

Check the new line of FWD heavy-duty trucks built for well logging, cementing, petroleum transport, off-highway pipeline hauling and heavy equipment transport. They fit today's oil operations best!

Heavy-Duty Vehicle Specialists

THE FOUR WHEEL DRIVE AUTO COMPANY • CLINTONVILLE, WISCONSIN • Canadian Factory: KITCHENER, ONTARIO

Positive Power

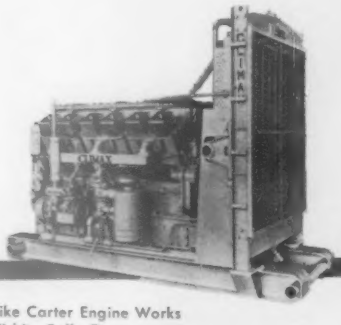


When positive power is needed 24 hours a day every day of the year, Climax Blue Streak Engines deserve first consideration. Dependability, economy, and a well established reputation have brought Climax Engines to their present leading position as power suppliers for oil and gas installations. The two Climax V-122's shown above are each driving a compressor for Republic Natural Gas Co. on their O'Connor lease, producing 1,500,000 cubic feet of gas per day, every day. On the coast, in the mountains, or on the plains, you'll see these Climax Blue Streak Engines operating efficiently throughout the oil country.

Get all the facts on Climax Oil Field Engines from your nearby distributor today.

WHERE POWER IS YOUR PROBLEM CLIMAX IS THE ANSWER.

climax BLUE STREAK ENGINES



CLIMAX ENGINE AND PUMP MFG. CO.

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J&L Supply offers you a dependable source of high quality drill pipe for deep or shallow drilling, and to accommodate various types of tool joints.

Available in Grades D and E, Blue Ribbon Heat Treated Alloy, and Blue Ribbon Plus Vanadium Heat Treated Alloy steels (105,000 psi minimum yield).

Interested, capable service everywhere—call your nearest J&L Supply representative.

The deepest well in the world, drilled in South Louisiana from the barge Keystone with J&L Blue Ribbon Plus Vanadium Drill Pipe to total depth of 22,570 feet. There was not a single pipe failure.

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SUPPLY DIVISION – Tulsa

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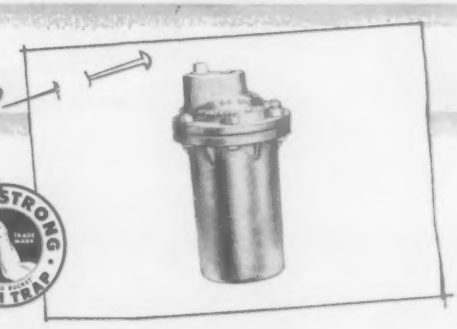
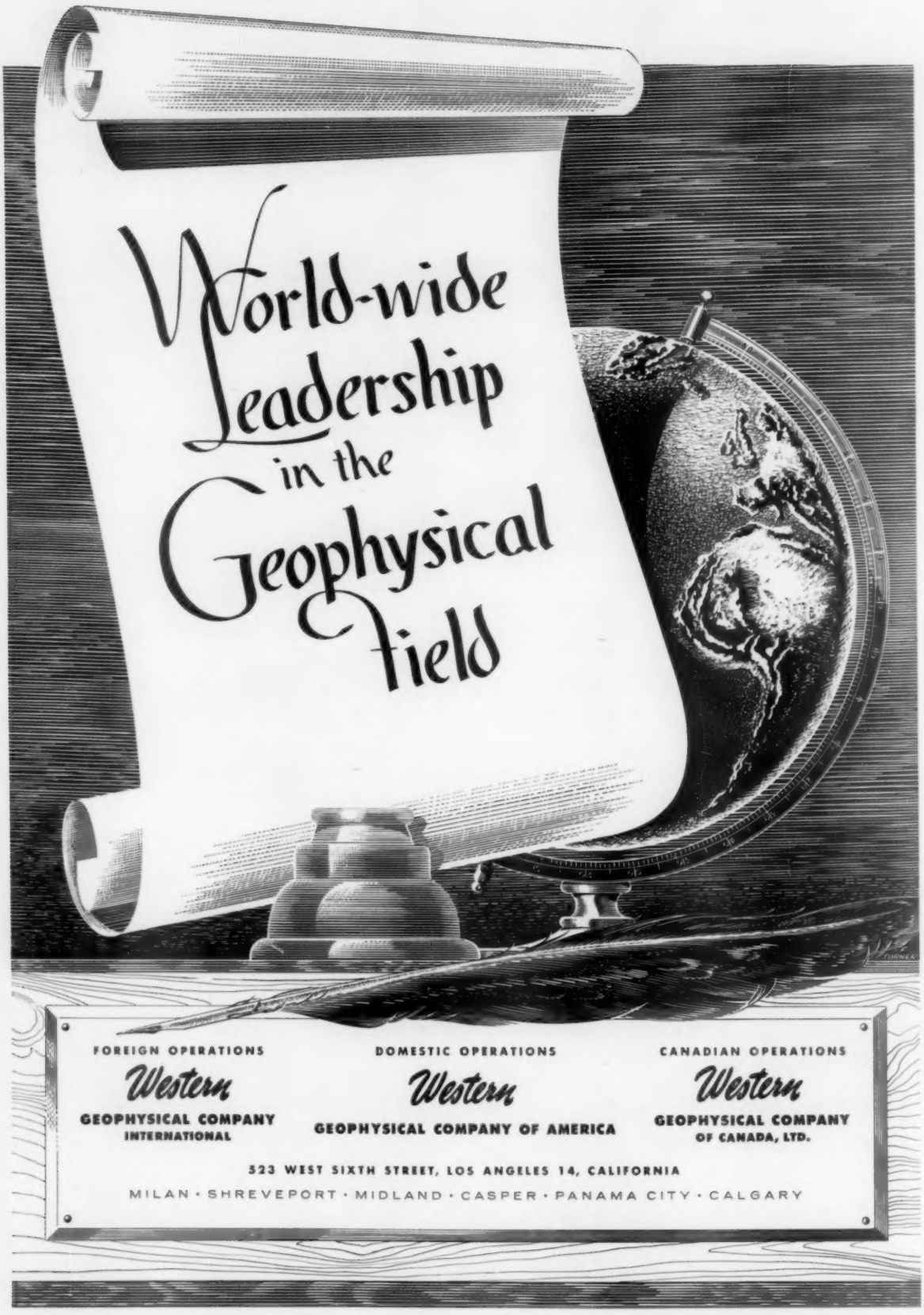
IT PAYS TO LOOK BEHIND THE PRICE TAG WHEN YOU SPECIFY OR BUY STEAM TRAPS. THE PRICE OF ARMSTRONG STEAM TRAPS REFLECTS MASS-PRODUCTION ECONOMIES RESULTING FROM THE LARGEST VOLUME OF TRAP BUSINESS OF ANY MANUFACTURER. THEY ARE A REAL BARGAIN IN TERMS OF QUALITY, CAPACITY AND DEPENDABILITY. NO OTHER TRAPS HAVE EVER ESTABLISHED SO ENVIABLE A RECORD FOR LONG SERVICE WITH LOW MAINTENANCE EXPENSE. APPARENT SAVINGS IN PURCHASE OF "CHEAP" TRAPS MIGHT BE EATEN UP QUICKLY IN HIGH MAINTENANCE COSTS, STEAM WASTE OR REDUCED OPERATING EFFICIENCY OF STEAM LINES OR EQUIPMENT. MANY PLANTS THAT HAVE KEPT ACCURATE RECORDS HAVE STANDARDIZED 100 PERCENT ON ARMSTRONGS. WRITE FOR CATALOG J. ARMSTRONG MACHINE WORKS, 8681 MAPLE STREET, THREE RIVERS, MICHIGAN.

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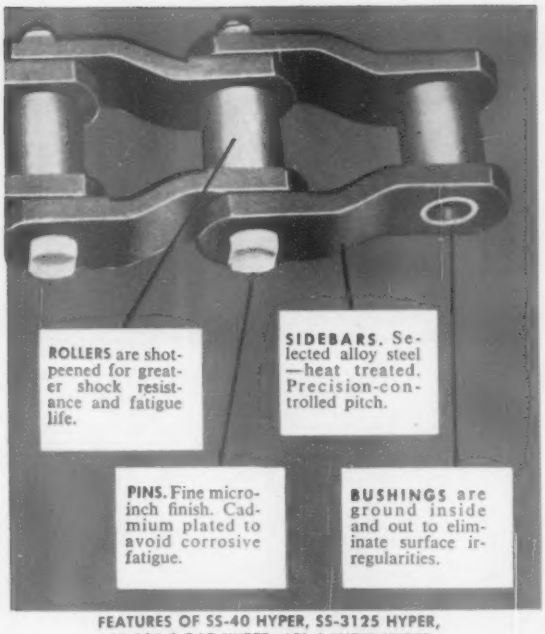
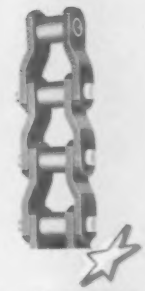

ROLLERS are shot-peened for greater shock resistance and fatigue life.
SIDEBARS. Selected alloy steel—heat treated. Precision-controlled pitch.
PINS. Fine micro-inch finish. Cadmium plated to avoid corrosive fatigue.
BUSHINGS are ground inside and out to eliminate surface irregularities.

FEATURES OF SS-40 HYPER, SS-3125 HYPER, SS-124 3-BAR HYPER, API-4 SUPER HYPER

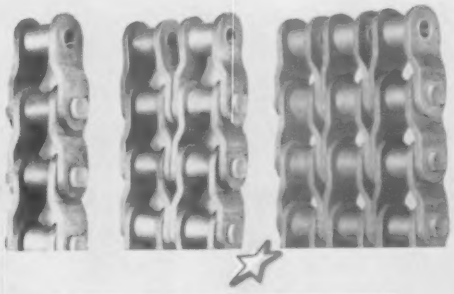
Drilling deep or shallow--

choose LINK-BELT API (SS type) chain

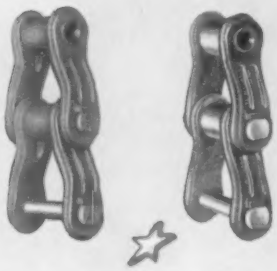
to get you there and back



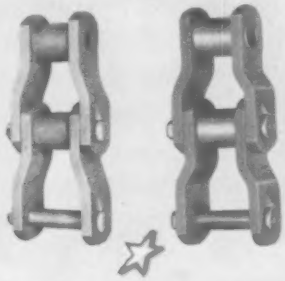
SS-40 HYPER Most widely used of all API rotary chains.



SS-3125 HYPER SINGLE, DOUBLE AND TRIPLE contribute unexcelled stamina to rotary, engine and hoisting drives.



SS-124 3-BAR HYPER AND SUPER HYPER are used for hoists and engine drives.



RED-HED chains answer need for good, durable, low-cost chain for shallow drilling.

Choose from the complete LINK-BELT line of API (SS type) chains . . . first choice in the field

Built and packaged for the toughest jobs . . . available at leading supply stores in the field

WHETHER it's hoisting or rotary service, deep or shallow drilling—Link-Belt has a chain for every need. More Link-Belt API chain is used than any other brand. That's because of features which have won acceptance from oil men everywhere. This chain is precision-manufactured—pitch holes and pitch are uniformly accurate . . . pins and bushings are ground to a fine micro-inch finish to eliminate fatigue-starting surface nicks.

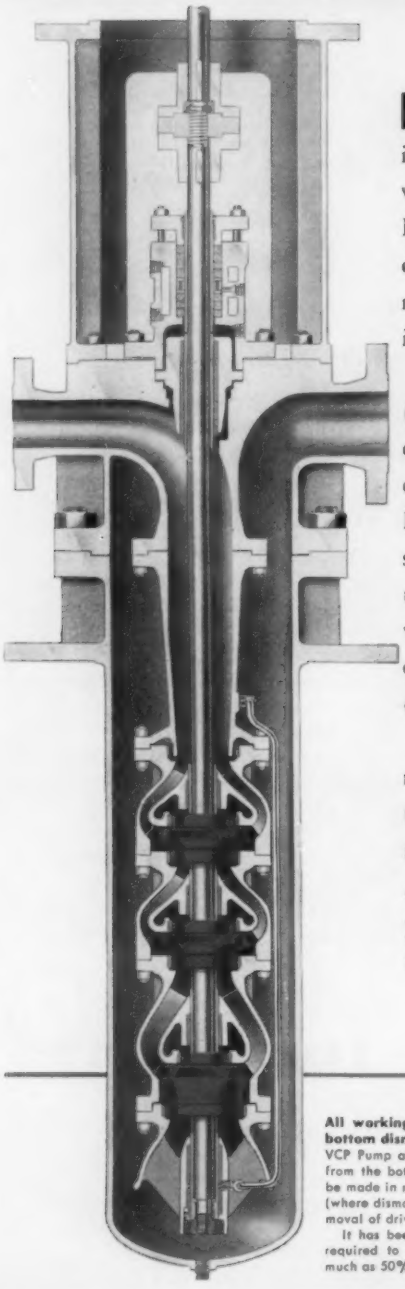
Link-Belt API chains are double-boxed and steel banded—effectively protected from sand, grit and wet weather . . . easily identified. For the full story, get your copy of new Catalog 2680 from your Link-Belt office or supply store today. 14,240

LINK-BELT

CHAINS and SPROCKETS

LINK-BELT COMPANY: Indianapolis 6, Houston 1, Dallas 21, Odessa, Tex., Shreveport, La., Los Angeles 33, Scarboro (Toronto 13); Export Office, New York 7. Distributors in All Fields.

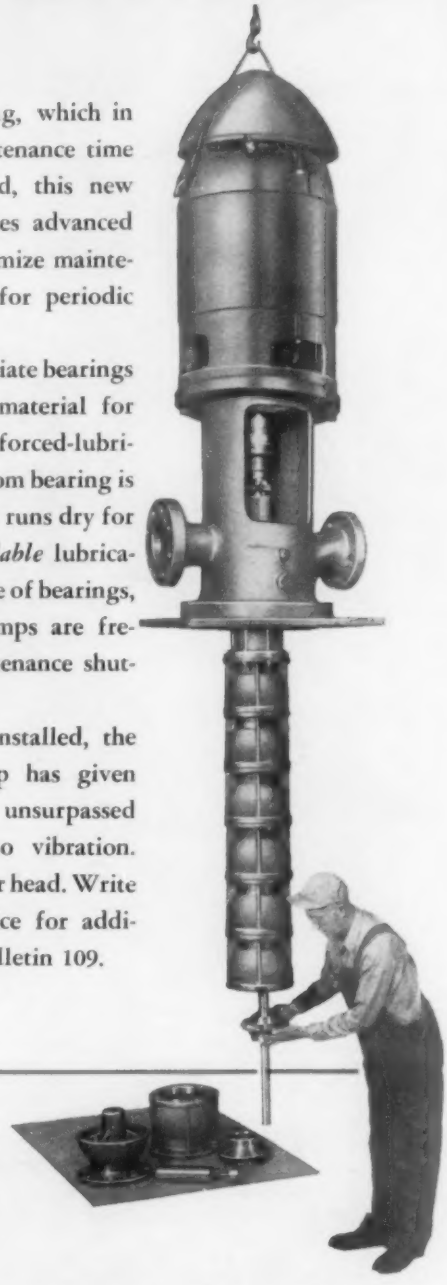
NEW! Bingham ALL WORKING PARTS



Besides bottom dismantling, which in itself greatly reduces maintenance time when attention is required, this new Bingham pump incorporates advanced design features which minimize maintenance, reducing the need for periodic inspection.

For example, all intermediate bearings (supplied of appropriate material for different pumpages) are forced-lubricated by the pumpage. Bottom bearing is lubricated even if the pump runs dry for short periods. This *dependable* lubrication greatly prolongs the life of bearings, which in conventional pumps are frequently the cause of maintenance shutdowns.

Wherever it has been installed, the new Bingham VCP Pump has given trouble-free service — plus unsurpassed smooth operation with no vibration. Available for any capacity or head. Write your nearest Bingham office for additional information, and Bulletin 109.



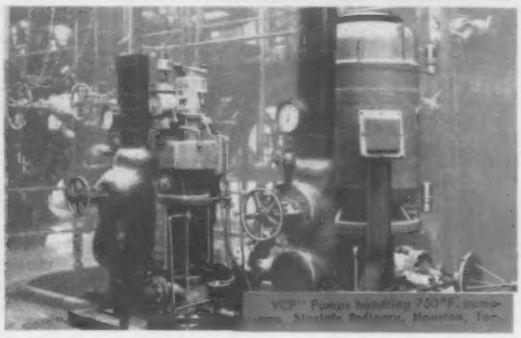
All working parts of pump easily accessible with bottom dismantling. One man can service the Bingham VCP Pump after lifting pump from well. By dismantling from the bottom, repair or replacement of any part can be made in much less time than with conventional pumps (where dismantling begins from the top, necessitating removal of driver and head before pump unit is accessible).

It has been estimated by various operators that time required to reach working parts has been reduced as much as 50%.

VCP VERTICAL PUMP FOR LOW NPSH
ACCESSIBLE WITH BOTTOM DISMANTLING

Bingham "VCP" pump installation at [illegible]

Bingham Type "VCP" Pumps at the Champlin Refining Co., Enid, Okla.



"VCP" Pumps handling 750°F. pumpage, Sinclair Refinery, Houston, Tex.

One of a group of "VCP" Pumps [illegible]

Partial list of major oil companies with Bingham "VCP" Pumps in operation or on order:

Ashland Oil & Refining Co.	Phillips Petroleum Co.	Chemical Construction Co.
Gulf Oil Corporation	American Cyanamide Co.	Champlin Refining Co.
Sinclair Oil & Refining Co.	ESSO-Standard Oil of N. J.	Pacific Gas & Electric Co.
Sun Oil Company	British American Oil Co., Ltd.	Socony Mobil
The Texas Company	Lakehead Pipe Line Co.	Aerojet General Corp.
Imperial Oil Co., Ltd.	Creole Petroleum Co.	Great Lakes Pipe Line Co.
Shell Oil Company	Humble Oil Company	Kaneb Pipe Line
Deere & Company	Standard Oil Co. of Indiana	Buckeye Pipe Line Co.

Bingham SINCE 1921

DOUBLE VOLUTE PUMPS RADIAL BALANCE

BINGHAM PUMP COMPANY
General Offices: 2800 N. W. Front Avenue, Portland 10, Oregon
Factories: Portland, Ore. • Vancouver, B. C., Canada

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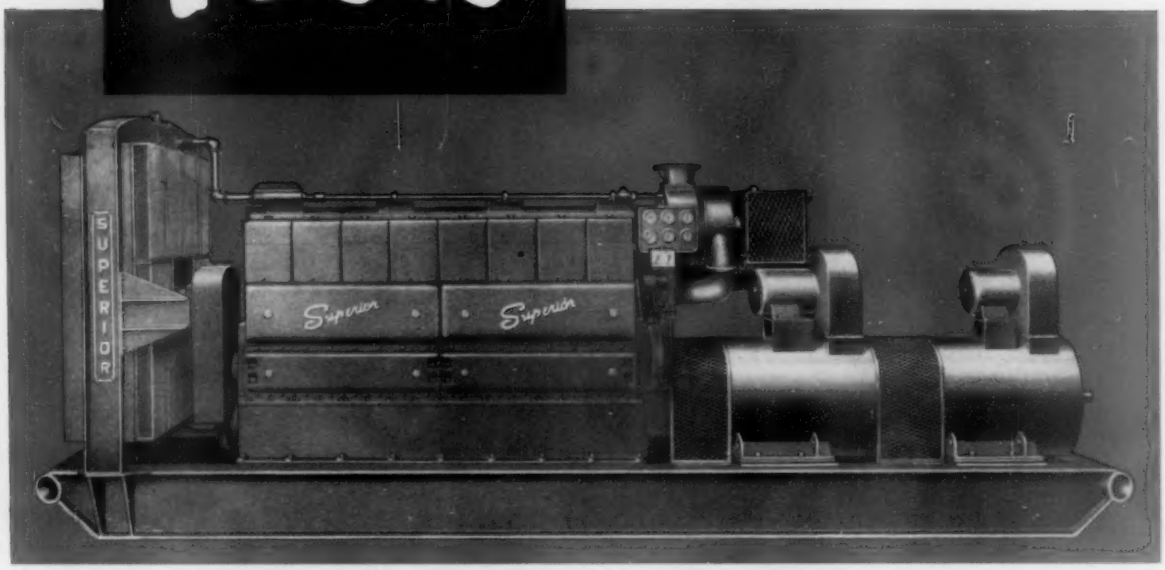
New

Lighter

Extremely Simple

More Powerful



WHITE'S DIESEL-ELECTRIC

drilling rig power plant

Now, combining new important advancements and design refinements, White offers a lighter, more compact package that provides extreme simplicity in arrangement and operation, and more power for deep drilling—land or offshore.

The highly developed components consist of two or more engine-generator sets, a minimum of three drive motors, and simple controls. White's well-known Superior oil field engine and a pair of time-proven 300 to 550 kw generators in tandem make up an engine-generator set. Total weight of one set alone is almost 8 tons lighter than comparable units! Simplification, compactness and lighter weight are greatly achieved through concentration of power in the heavy-duty drive motors. The largest units are rated 1000 hp continuous and 1250 hp intermittently, permitting use of only one motor for the drawworks, and one for each mud pump. This eliminates mechanical connections required in other plants where multiple motors are necessary. Use of fewer motors results in simplest controls, a lighter rig, and a net result of lower over-all cost. All components are standard production items, allowing greatest interchangeability, and smaller inventory of parts.

For complete information and advantages of White's diesel-electric operation, get White's Bulletin 101 available from all leading rig manufacturers, White field representatives, or through the White Diesel Engine Division.

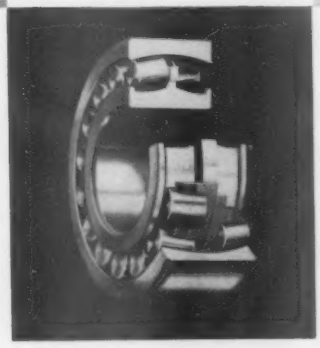
White Diesel

WHITE DIESEL ENGINE DIVISION
THE WHITE MOTOR COMPANY

Plant and General Offices: Springfield, Ohio

TORRINGTON SPHERICAL ROLLER BEARINGS GIVE YOU THESE FEATURES

- inherent self-alignment
- conformity of rollers to races
- positive roller guidance
- land-riding bronze cages
- integral flange for stability
- maximum radial and thrust capacity
- long, smooth service life
- even load distribution



Mated perfectly ~ for life!

Make a point to notice the roller end and center guide flange in a Torrington Spherical Roller Bearing. The perfect mating there means a smoother, longer bearing life.

Roller end and flange surfaces alike are ground to a common spherical radius centered on the common vertex of bearing axis and roller axis. Under all load conditions, the rollers bear lightly but constantly against this flange. This guides the roller positively with minimum friction and prevents skewing. Stress concentrations leading to early failure are avoided, so the bearing will serve you many good turns longer.

This is the kind of feature Torrington builds into its bearings out of its experience with all major types serving in all kinds of equipment. Care for such details is matched only by our care in mating the *right* bearing to the *right* job. In this, your Torrington representative is an expert: call on him when you need help. *The Torrington Company*, South Bend 21, Ind.—Torrington, Conn.

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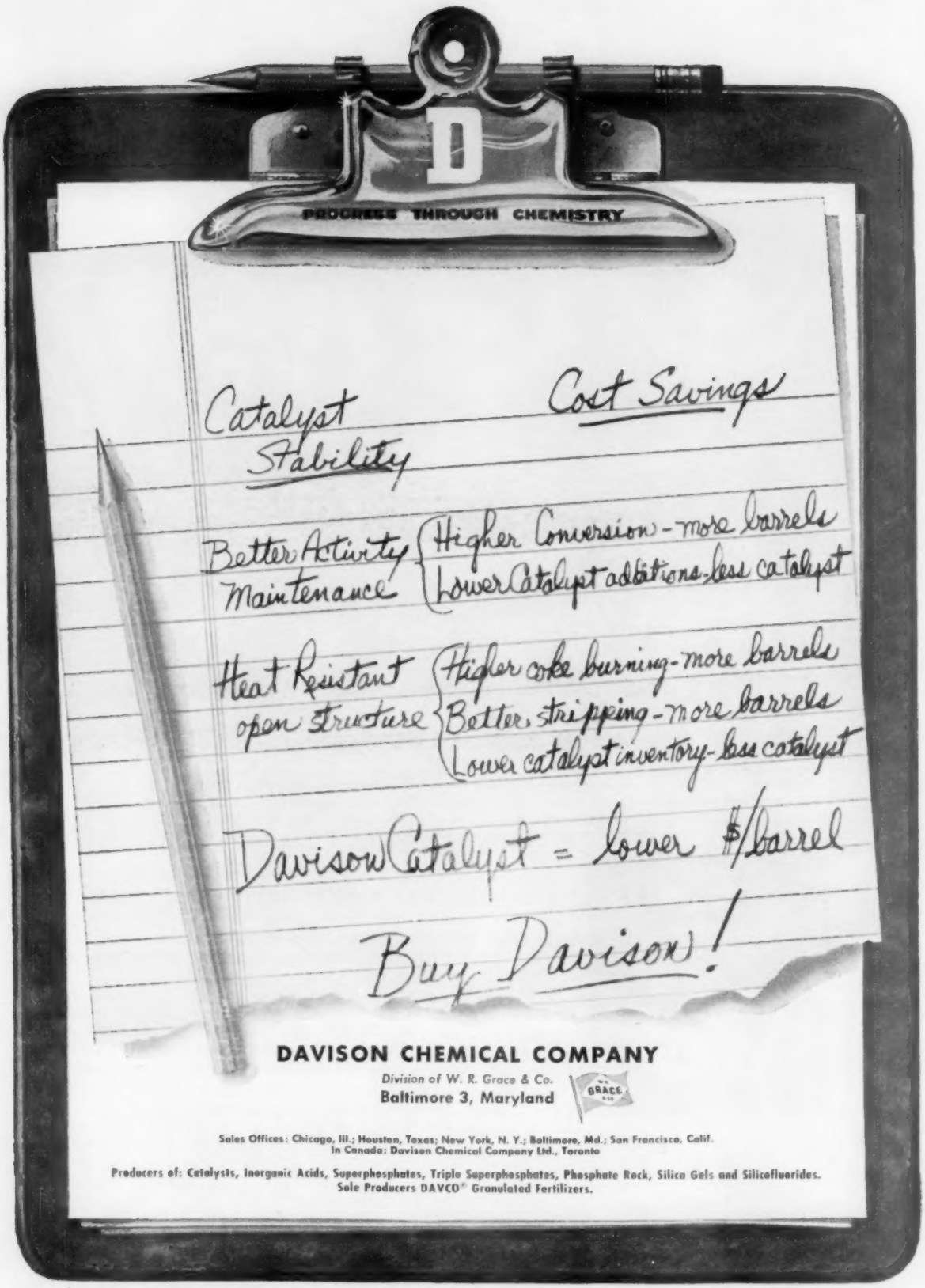

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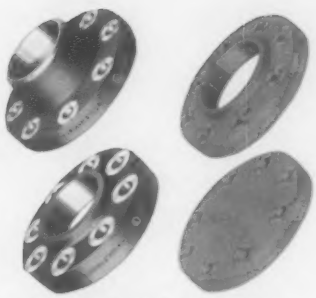
Sole Producers DAVCO® Granulated Fertilizers.

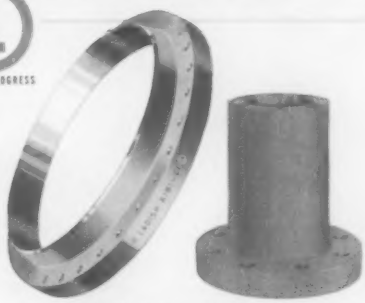
BUTT WELDING FITTINGS
(IPS)



ASA and MSS FLANGES

TO MARK PROGRESS

BUTT WELDING FITTINGS
(TUBE O.D.)



LARGE O.D., TEMA and
LONG WELDING NECK FLANGES

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SCREWED and SOCKET FITTINGS

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FOR *Complete Service* IN *Controlled Quality* FITTINGS

CARBON • ALLOY
AND STAINLESS STEELS

WHATEVER your fittings requirements . . . regardless of the type, size, wall thickness, pressure rating or material specification . . . you can get prompt, efficient, *complete service* by specifying LADISH and ordering from your local Authorized Ladish Distributor.

A broad, full-range line produced to unsurpassed standards of metallurgical and manufacturing integrity . . . plus adequate local stocks . . . gives you double assurance of satisfaction.

For complete service on your fittings requirements . . . call your Authorized Ladish Distributor.

Catalogs available on request. Please indicate specific product lines for which information is desired.

THE COMPLETE *Controlled Quality* FITTINGS LINE

LADISH CO.

CUDAHY, WISCONSIN
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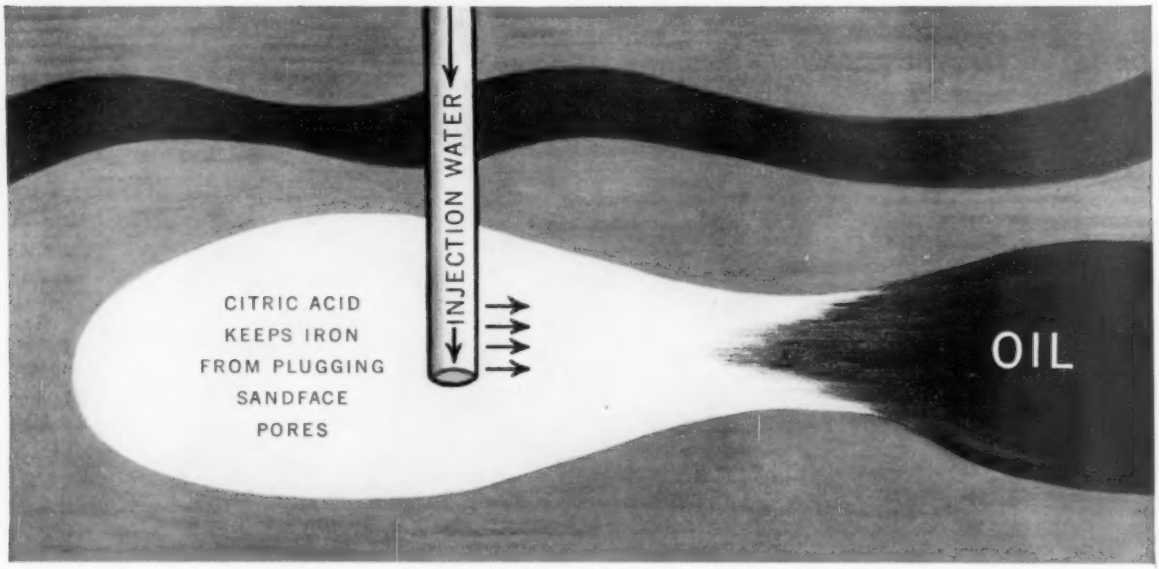
Los Angeles • San Francisco • Seattle • Havana • Mexico City • Brantford, Ont.

Improve flow rates in secondary recovery



Add CITRIC ACID to injection water

● When you add citric acid to injection water you prevent the formation of iron precipitates which plug the sandface, restricting the flow rate. This means that you reduce the need for temporary (and sometimes costly) methods of freeing iron-plugged wells.

Also important, citric works even in high calcium waters. Citric preferentially sequesters the iron and keeps it soluble. Other ions do not interfere.

Pound for pound, citric acid sequesters iron better and at less cost than any other agent. It's nontoxic and safe to handle, too.

Pfizer supplies huge amounts of citric acid for a multitude of industrial uses throughout the world. This large volume production assures you of receiving all the citric you need without delay. For further information on preventing injection well plugging with Pfizer Citric Acid write to:

CITRIC ACID ADDED
In this bottle, only 10 ppm of Pfizer Citric Acid has been added to brine containing 2 ppm iron.

NO CITRIC ADDED
The brine in this bottle also contains 2 ppm iron. But no citric has been added.

CHAS. PFIZER & CO., INC., Chemical Sales Division
630 Flushing Ave., Brooklyn 6, N.Y.
Branch Offices:
Chicago, Ill.; San Francisco, Calif.; Vernon, Calif.; Atlanta, Ga.; Dallas, Tex.

Manufacturing Chemists for Over 100 Years

Pfizer

SIX SIZES—½ to 30 HP—420 to 10 rpm—single and two double reduction ratios. Output torque ratings up to 21,000 lb-in.

FALK ALL-STEEL Shaft Mounted Drives

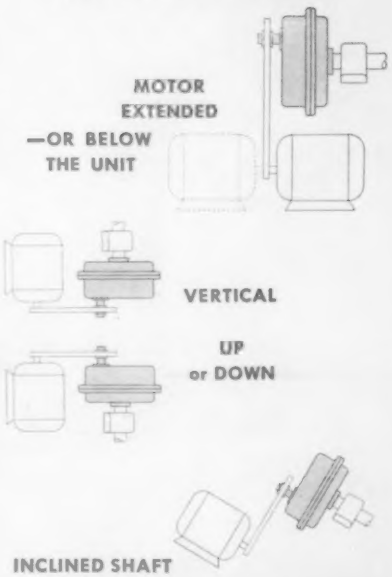
The photograph above typifies the way FALK Shaft Mounted Drives furnish the economical solution to problems of efficient speed reduction in a limited space. Within their rated capacities, these versatile reducers are designed to drive any machine and to fit any space requirement.

FALK Shaft Mounted Drives mount on the driven shafts and are connected by V-belt or chain to any convenient rotating power source. Unlimited choice of output speeds between 420 and 10 rpm is made possible by varying the ratio of driving sheaves or sprockets.

These units, with precision-cut gears of highest efficiency, use a minimum of power. They need no adjustable motor bases or slide rails; thus they save material. And, because they are readily available and easily installed or moved, they save time. Best of all, they are backed by FALK's unmatched experience in precision-gear manufacture.

Promptly available from factory and distributor stocks, from *coast to coast*. Ask your Falk Representative or Distributor for details—or write us for **Bulletin 7101.**

A FEW OF THE MANY POSSIBLE DRIVING ARRANGEMENTS



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- Flexible Couplings
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- Marine Drives
- Steel Castings
- Weldments
- Contract Machining

FALK

...a good name in industry

Christmas Tree Roots

Who can say when and where an idea is born? Creative design engineers don't work by the clock. Their scratch pad is more often the back of a napkin or a scrap of paper. They think and talk shop all the time.

Perhaps these engineers are talking about last weekend's catch.

Fishing conditions in the Gulf of Mexico have nothing to do with the Oil Center Tool Company necessarily, or Christmas Trees.

But the point is, tomorrow's coffee break may see these same scientists discussing an idea. It will be an idea that someday may have a direct bearing on how you will complete your well or produce your oil and gas.

Christmas Trees aren't born in a machine shop . . . they're born in the minds of men.

That's why the Oil Center Tool Company places so much emphasis on minds . . . that's why O-C-T emphasizes research and engineering.

Roots of O-C-T trees go deep—miles into the earth, as a matter of fact.

But, there is another depth which is the real reason for the stability of O-C-T—depth of research and development.

The need for efficient, economical well control equipment stamped "O-C-T" that is being used so widely in the oil patches today was anticipated long before that need became critical.

The idea for much of this equipment was born . . . the seed sown . . . perhaps at a coffee break.

But, ideas aren't transmitted directly to the machine shop.

These have a long gestation period.

Many months of laborious paper work, model experimentation and testing are necessary before an O-C-T product makes its debut in an oilfield.

Design must be right . . . the product must be right.

O-C-T has pioneered many improvements, many completely new designs, in the area of well control equipment. The company's list of "firsts" is long.

This "first thirst" that is part of the spirit of O-C-T is always being slaked by experienced engineers . . . by imaginative researchers . . . by practical development men.

These men know the oil industry. They know its problems.

More than that, they have the ability to plan for the future, to anticipate problems of tomorrow.

The best in oilfield equipment is being turned out in O-C-T shops.

And the best in oilfield equipment to solve difficult problems in the future is being turned over in the minds of men . . . being charted on design boards.

Seeds originate at O-C-T.

And they're sown there . . . cultivated there.

The harvest is yours!

O·C·T

OIL CENTER TOOL CO.

Export Representatives: South America — East West Oiltools, C. A., Del Lago Hotel, Maracaibo, Venezuela. Address Export Inquiries for All Other Countries to P. O. Box 3091, Houston, Texas.

KEEP A KIDDE EXTINGUISHER NEAR EVERY HAZARD!

Move fast against fire the instant it strikes, and you can stop it with little damage. But let it get a head start, and you may lose your equipment, your buildings . . . or your life.

Be selective in your choice of fire extinguishing equipment. Choose Kidde! You can be certain of rugged construction, simple operation, and absolute dependability.

For more than thirty years, Kidde fire extinguishers have been built to the most exacting specifications, have passed the most rigorous of tests, have the highest ratings. There is not a better-made extinguisher on the market today.

In ease of operation Kidde extinguishers also stand unsurpassed. The trigger-release grip on Kidde carbon dioxide and dry chemical extinguishers is the fastest and most natural to use. With it, even inexperienced operators can move swiftly and confidently against a blaze, extinguishing flames in seconds. You simply aim the horn, pull the trigger, and fire's out. Models with squeeze valves available too.

Finally, there is the Kidde service organization. In cities everywhere there are trained Kidde representatives who are ready to service your extinguishers.

For more information about the complete line of Kidde extinguishers, write for Kidde's P-8 Catalog.

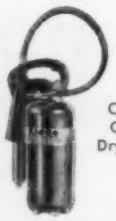
Walter Kidde & Company, Inc. 154 Main St., Belleville 9, N. J.

Walter Kidde & Company of Canada Ltd., Montreal—Toronto

Kidde

The words 'Kidde', 'Lux', 'Lux-O-Matic', 'Fyre-Freez' and the Kidde seal are trademarks of Walter Kidde & Company, Inc. and its associated companies.

Foam
Soda-Acid
Clear Water
Anti-Freeze



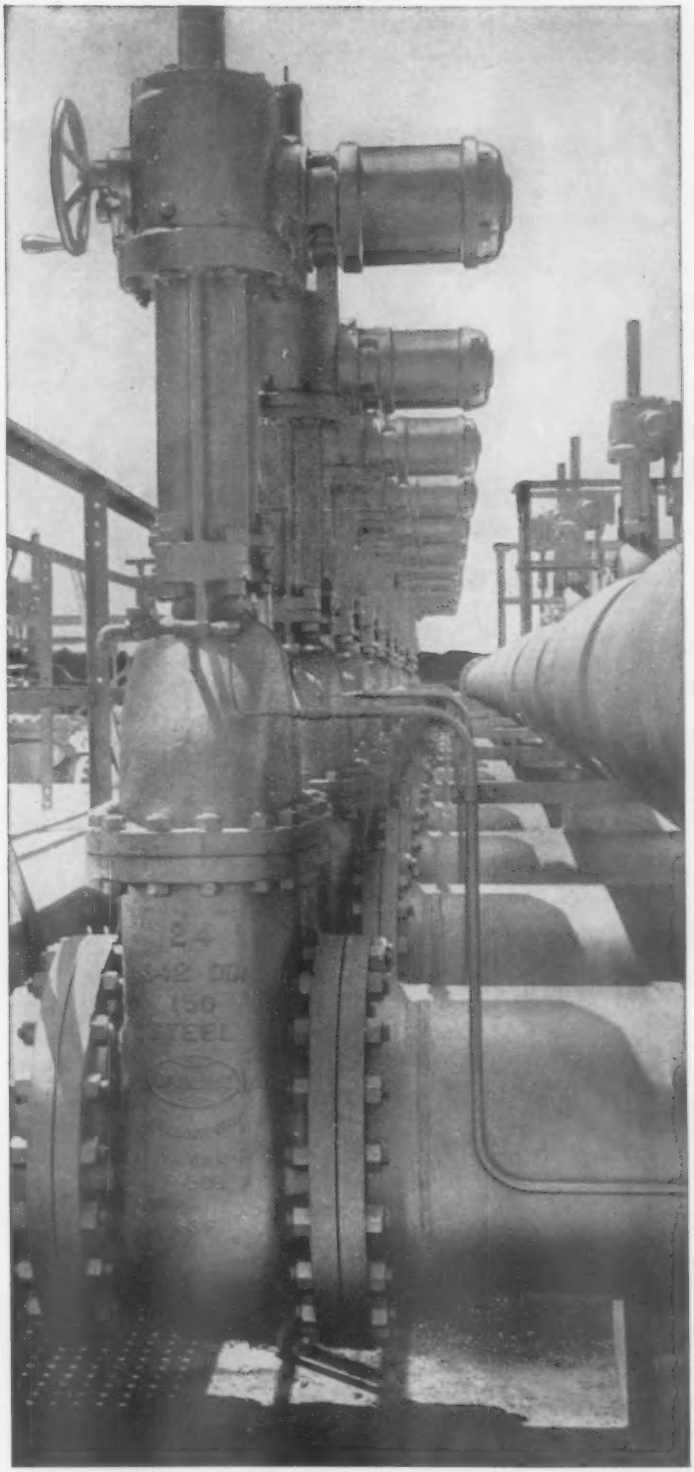
Cartridge-
Operated
Dry Chemical

Pressurized
Dry Chemical

Squeeze-Valve
Carbon
Dioxide

Trigger
Carbon
Dioxide

Be sure to see the complete line of **Kidde Portables** at **Booth No. 1347**, at the **Eighth Plant Maintenance Show**, January 28-31, 1957, Cleveland, Ohio.



DARLING VALVES

How to line up a *cost-important* principle

THESE Darling gate valves have one thing in particular no other gate valves can match—Darling's *fully revolving double disc, parallel seat principle.*

What does this mean?

Skipping to end results . . . smoother, easier valve operation . . . automatic compensation for valve body distortion to assure tight closure . . . and avoidance of wear concentration areas on both discs. In turn all this just naturally adds up to longer valve life, surer performance, less maintenance, less part replacement, less down time, and lower over-all operating cost.

These gains are a matter of record—the real reason why Darling valves today are picked for so many oil and gas line jobs. Give us an idea of your service needs and get complete, specific details on the Darling valves that can do the *best* kind of a job for you!

◀ *Line-up of Darling 24" motor-operated steel gate valves at a major crude oil pumping station. Here, as elsewhere, Darling's fully revolving double disc feature pays off.*

DARLING VALVE & MANUFACTURING CO.

Williamsport 1, Pa.

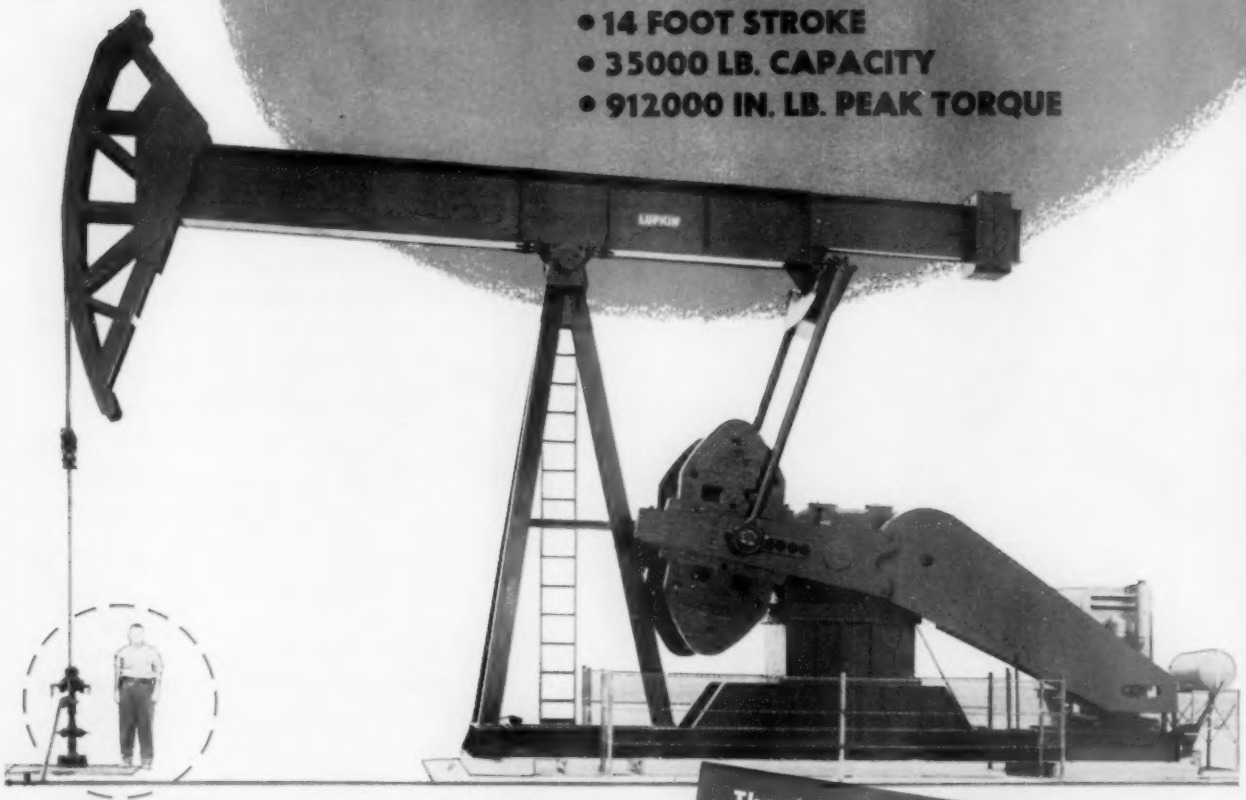
Manufactured in Canada by Sandilands Valve Manufacturing Co., Ltd., Galt 19, Ontario

the Biggest One Yet!

LUFKIN'S *new*

CB - 912DA - 168 - 35

- 14 FOOT STROKE
- 35000 LB. CAPACITY
- 912000 IN. LB. PEAK TORQUE



To fulfill the ever growing demand for longer stroke, greater beam capacity, and more effective counterbalance, Lufkin is proud to present this giant new unit which is capable of handling the heaviest pumping jobs in the field today.

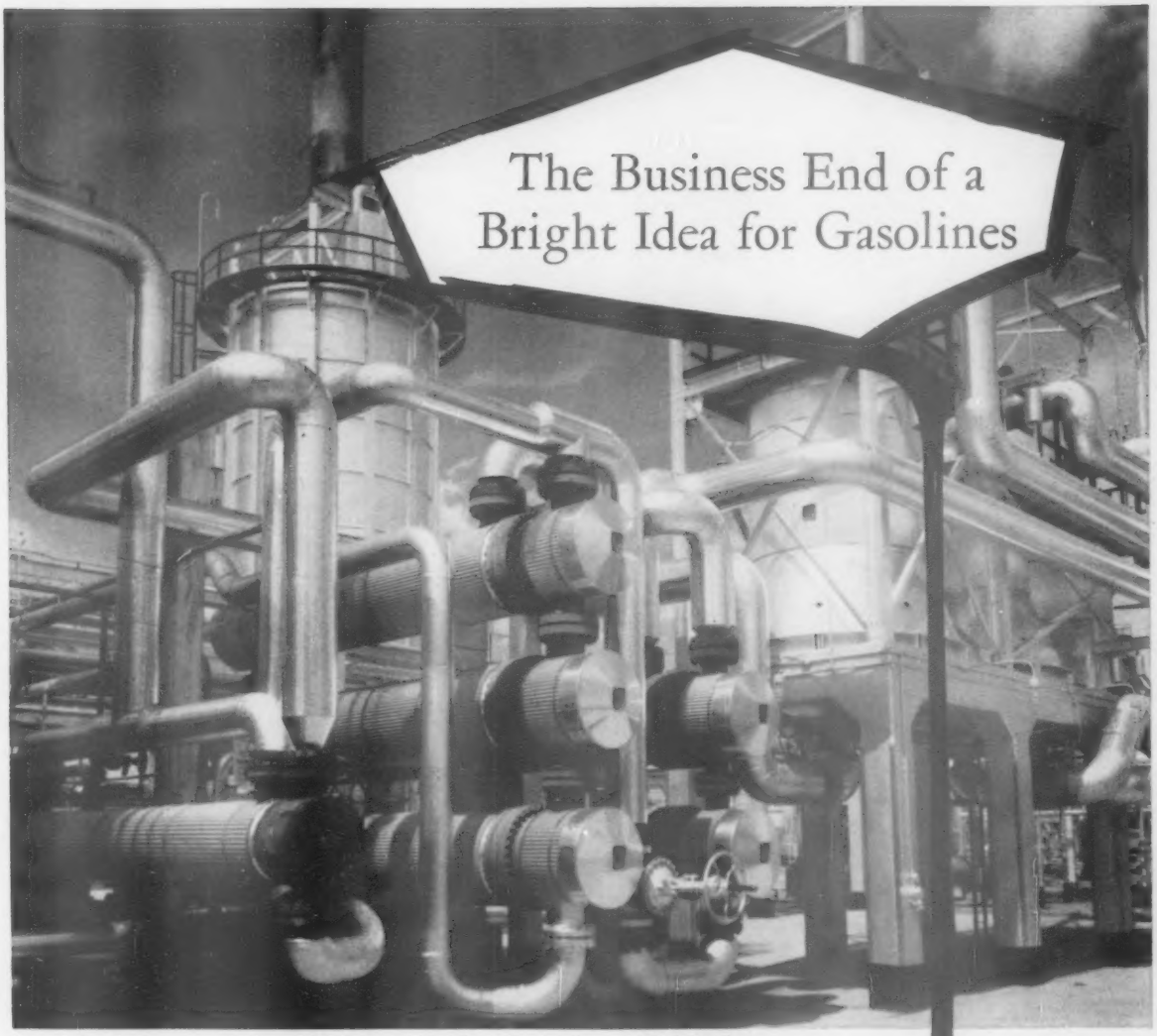
The design of this new 14-footer features the same well known **RUGGEDNESS** and **DEPENDABILITY** which has made LUFKIN units the standard of comparison the world over.

Lufkin **FOUNDRY & MACHINE COMPANY**

LUFKIN, TEXAS

Branch Sales and Service: Houston • Dallas • New York • Tulsa • Los Angeles • Seminole • Oklahoma City • Corpus Christi • Odessa
Kilgore • Wichita Falls • Casper, Wyoming • Great Bend, Kansas • Effingham, Illinois • Duncan, Oklahoma
Brookhaven, Mississippi • El Dorado, Arkansas

Lufkin equipment in Canada is handled by THE LUFKIN MACHINE CO., LTD., 9350 65th Avenue, Edmonton, Alberta, Canada
3913 18th Avenue, Regina, Saskatchewan, Canada



Heater, heat exchangers and reactors, heart of UOP Rexforming Unit at Cosden Petroleum Corporation, Big Spring, Texas.

This is the heart of the UOP Rexforming process, a new development in petroleum refining that produces automotive gasolines with the industry's highest octane ratings with remarkable efficiency and economy. The idea for Rexforming was born in Universal's research laboratories. UOP develops and designs the equipment required to make this process commercially practical. UOP field engineers follow every phase of construction and are right on hand to see that the actual plant functions smoothly from the very start. This is the full measure of Universal's service. From bright idea to smooth operation, it's a service that is available to all refiners everywhere.

UNIVERSAL OIL PRODUCTS COMPANY
30 Algonquin Road, Des Plaines, Illinois, U. S. A.
Forty Years Of Leadership In Petroleum Refining Technology

UOP®

FAST REPLACEMENT

When a refinery has to shut down for a replacement or repair—that's the time when action and know-how count.

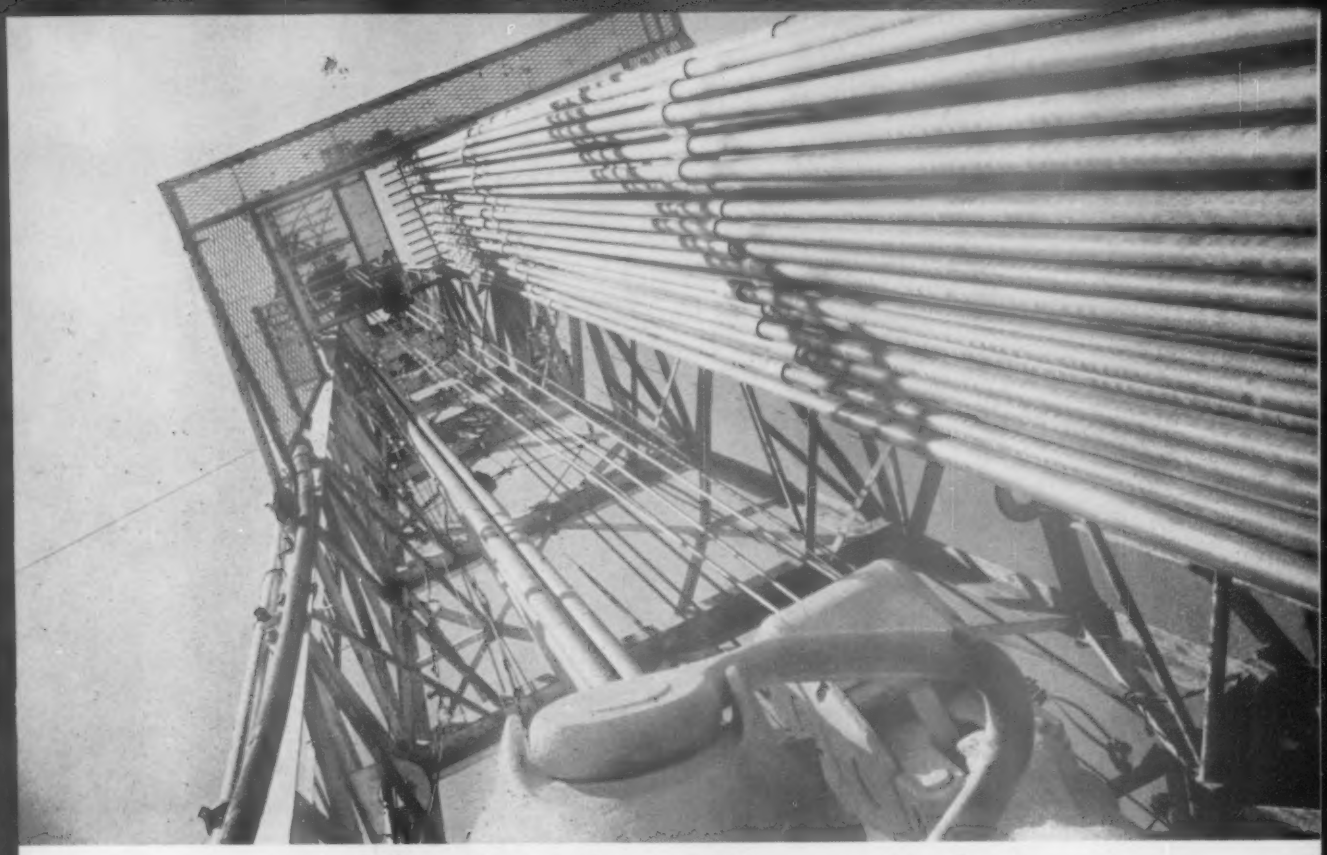
The special spiral fin unit here shown had to be built over a week-end to get a large oil refining plant back on stream.

Such repair and replacement work has added to the fine reputation Sun Ship has won through years of service in the construction of oil refining and chemical equipment of every kind.

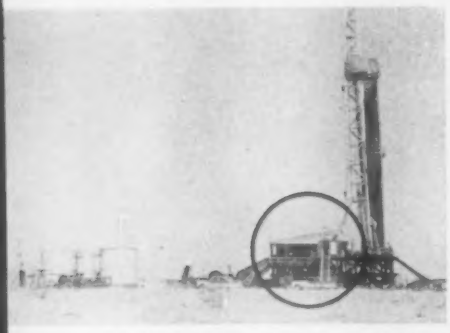
Sun

SHIPBUILDING & DRY DOCK COMPANY

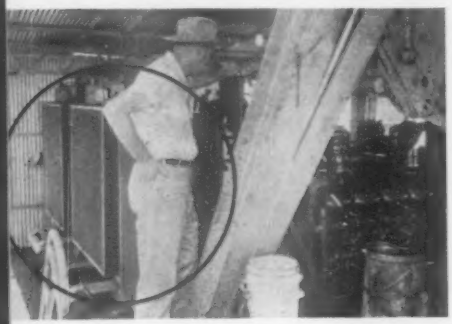
ON THE DELAWARE SINCE 1916 CHESTER, PA.



Treble Stand a Minute Helps Drilling Contractor Fight Price Squeeze



Treble-stand rig drilling in the Ellenburger zone, southwest of Andrews, Texas.



Closeup of the L3460 drilling engines. There have been no major repairs to these engines in three years of operation, and no overhauls.

Lugging power and acceleration of Le Roi L3460 engines (600 hp) keep costs down by making faster round trips possible.

No overhauls or major repairs required in three years of operation.

This rig with its 142-ft. mast is drilling in the Ellenburger zone in West Texas. It is as modern and as competitive as man can make it.

Fast trips improve cost picture. Three Le Roi L3460 engines average a treble stand, 90 feet of 4½ inch pipe, a minute when coming out of the hole. They provide immediate response to load demands. In fact, the lugging power and acceleration is such that often the driller pulls a treble stand in only 40 seconds.

More horsepower per dollar. The L3460, a valve-in-head V-12, packs a lot of power in a small space. It's a compact, high-output engine that produces 600 maximum horsepower. Its short-stroke design gives you both horsepower and a wide speed range up to 1350 rpm without compromising engine life.

Plenty of power, yet easy to move. According to the drilling superintendent, the L3460's provide his rig with plenty of power for deep drilling. Moving day is no problem either, because these engines are only 164 inches long. This allows them to be easily trucked over the highways to the next drilling site.

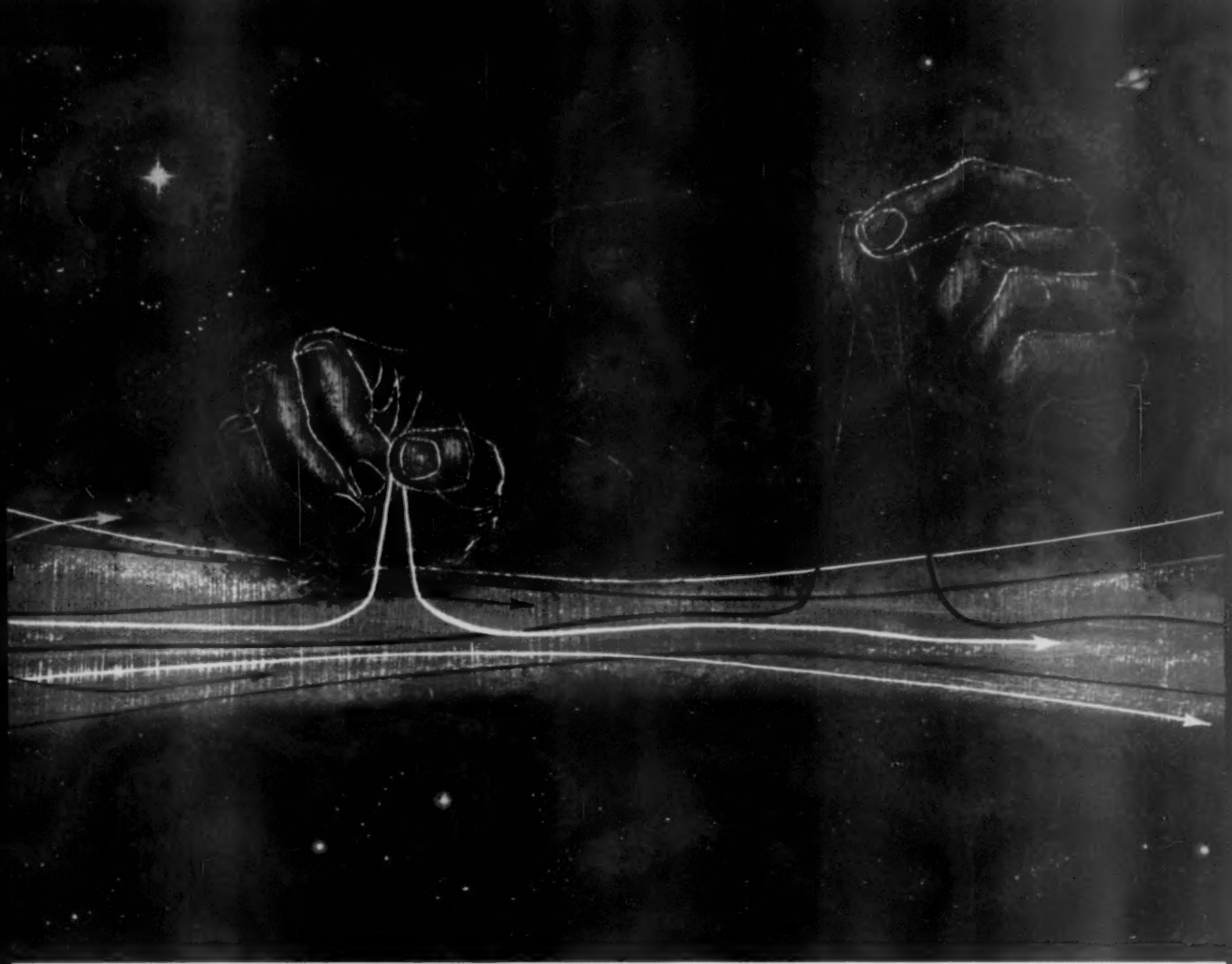
Minimum operating and maintenance costs. The L3460 represents the first truly new design concept in 16 years. It gives you: improved fuel economy; integral crankcase and cylinder construction for greater rigidity; longer bearing life; hydraulic valve lifters; better manifolding; husky crankshaft with integrally forged counterweights for unbelievably smooth operation.

Because of design features like these, the engines on this rig have performed dependably for three years without any major repairs or overhaul.

If you are having trouble with drilling costs, look into Le Roi drilling engines. They have what it takes to make your bids profitable. Sizes range from 208 to 635 hp. Write for our latest bulletin.

P-147

LE ROI Division of Westinghouse Air Brake Co., Milwaukee 1, Wisconsin, manufacturers of Cleveland air tools, Tractair, portable and stationary air compressors, and heavy-duty industrial engines. Write us for information on any of these products.



the analytical technique of tomorrow...

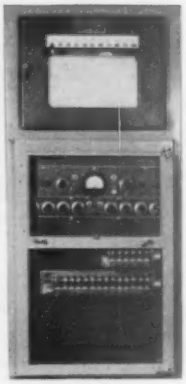
CONTINUOUS GAS CHROMATOGRAPHY

ready for your process stream today!

In the past twenty years, no single achievement has been more significant to the field of Process Control than the perfection of the technique of CONTINUOUS GAS CHROMATOGRAPHY. This remarkable new method brings a new level of reliability to plant stream analysis – and with it, simplicity unequalled by any other analytical technique. Many authorities have predicted it will bring about a revolution in continuous process control – through improved product quality, and increased yields.

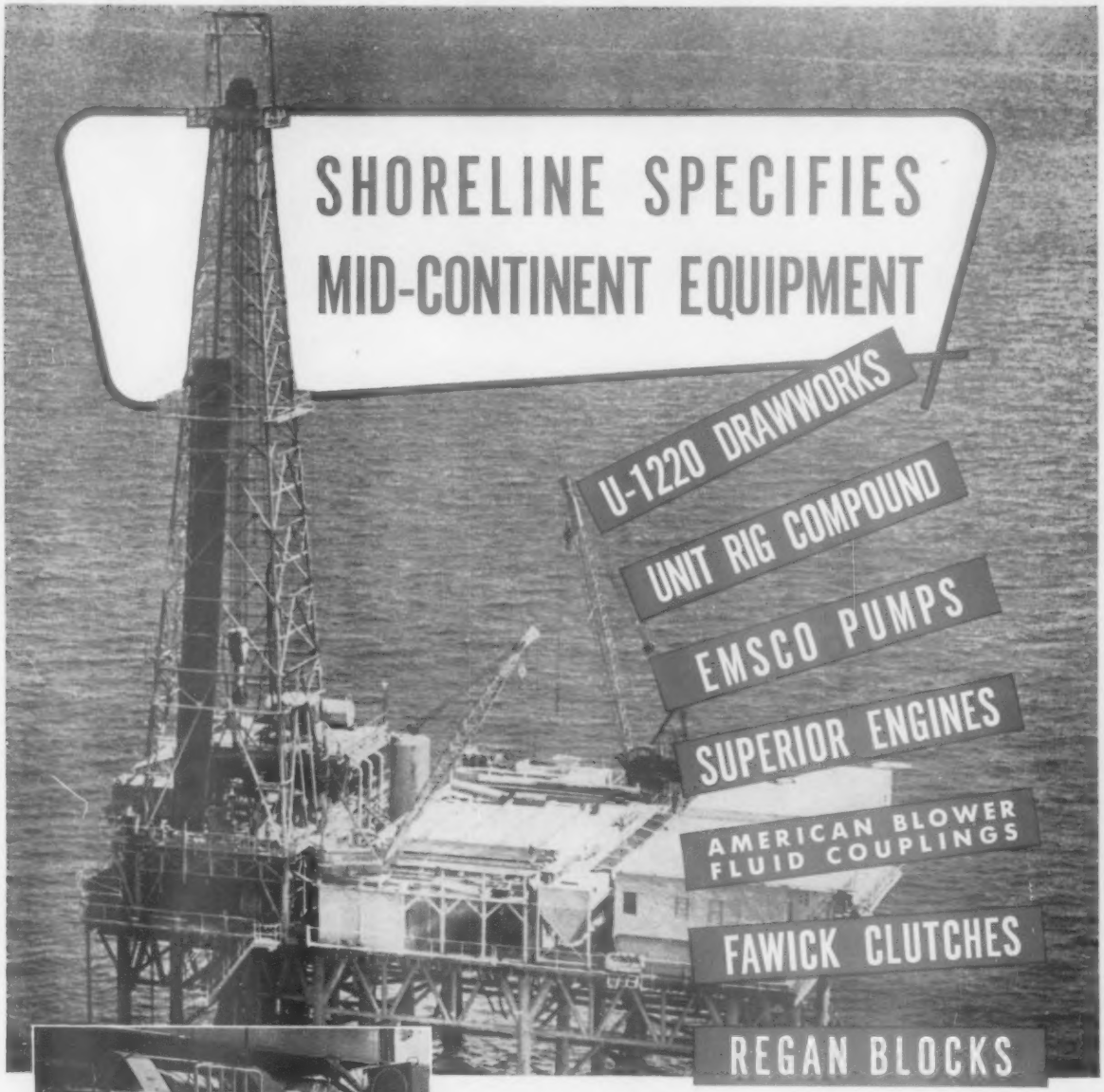
Now, as a result of the advanced development work of a leading chemical company . . . precision engineering by Watts Manufacturing Company, Ronceverte, W. Va. . . . and application engineering skill and national sales and service by Beckman Instruments, Inc. – a fully-engineered, thoroughly tested CONTINUOUS GAS CHROMATOGRAPH is available for delivery to your plant – *months ahead of the most optimistic schedules.*

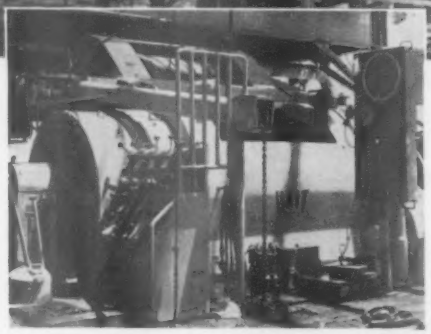
To obtain full information about this important new instrument, write Beckman Instruments, Inc., Process Instruments Department, Fullerton, California. Ask for Data File N-29-24.



Beckman® / *process instruments*

SHORELINE SPECIFIES MID-CONTINENT EQUIPMENT





Derrick floor view of Shoreline's U-1220 drawworks and the driller's position.

Offshore drilling calls for equipment engineered to fit exact drilling requirements. Shoreline Drilling Company specified Mid-Continent equipment for their newest offshore rig, taking advantage of the advanced engineering that goes into equipment supplied by Mid-Continent Supply Company.

PESA — Partners in Petroleum Progress

MID-CONTINENT Supply Company

MID-CONTINENT BLDG. FORT WORTH, TEXAS

THE WORLD'S LARGEST INDEPENDENT OIL FIELD SUPPLY COMPANY

SHEFFIELD
ARMCO

How Sheffield Steel Serves a Booming Market

The Liquefied Petroleum industry is flashing one of the most phenomenal growth records on the industrial scene today. From one million in 1940, consumers of this heat-rich, clean fuel have multiplied to nine million.

Along with matching Sheffield steel plate for forming into tank shells, the deep drawn, semispherical Sheffield tankheads pictured go to tank manufacturers across the nation.

The uses of LP gas are numerous and expanding. On the farm, it performs such chores as cooking, heating, refrigeration, machinery and tractor propulsion, crop drying and weed-burning—and now air conditioning.

In addition to this growing LP gas market for these pressure vessels made of Sheffield steel components, another big potential market looms up in the handling of liquid fertilizer. It seems a certainty the demand for pressure vessels will continue. If you have an active interest in this booming industry let us tell you how we can serve your need.

Look to Sheffield

for Quality Carbon and Alloy Steels Needed In Products of Your Manufacture—Ingots, Blooms, Billets, Plate, Structurals, Merchant Shapes, Manufacturers Wire, Bolt and Nut Products, including Structural Bolts.

SHEFFIELD DIVISION

ARMCO STEEL CORPORATION

SHEFFIELD PLANTS: HOUSTON • KANSAS CITY • TULSA

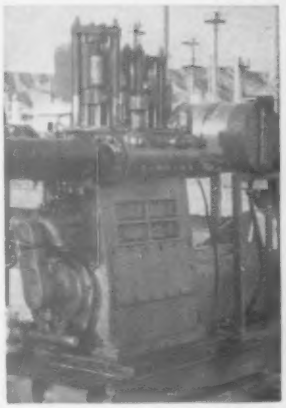
"It'll pay us to replace it with an ALDRICH PUMP!"

Downtime, due to pump failure, is always a costly item. It takes the reliability and freedom from maintenance found in an Aldrich Pump to eliminate downtime under continuous, heavy duty pumping operations. Top performance under these conditions has earned Aldrich its reputation for building pumps of highest quality and dependability.

The tougher the job . . . the more important it becomes to take advantage of our wide experience in providing the petroleum industry with pumps for water flood, pipeline, gasoline plant, hydrocarbon injection or petrochemical service.

In the less critical jobs, too . . . it makes sense to call Aldrich. The simplicity of the Aldrich Direct Flow design, with fluid-end sectionalization, offers substantial economies in both operation and maintenance.

A copy of our new condensed catalog, showing the line of Aldrich Pumps is yours for the asking. Write for Data Sheet 100. The Aldrich Pump Company, 9 Gordon Street, Allentown, Pa.



Shown above is one of a number of Aldrich 5" stroke, Triplex Pumps installed at a major west coast water injection project. These pumps are currently handling 35,000 bbl daily at injection pressures of 1,000 psi.

THE ALDRICH PUMP COMPANY

Field parts stock is available in Carmi, Ill., Charleston, W. Va., Houston, Tex., Los Angeles, Calif., Odessa, Tex., Tulsa, Okla.

Right from the start . . .

FAST

POWERFUL

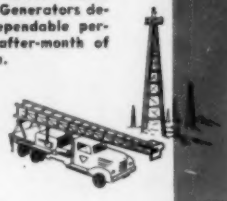
AMERICAN BOSCH MAGNETOS

Fast, powerful — that's the power-packed story of American Bosch Magnetos — today's finest ignition units for oil industry engines. Many advanced features give these famous Magnetos greater power for split-second starting, PLUS the built-in stamina that assures years of constant, trouble-free operation in Drilling, Producing, Pipe Line and Refinery service. That's why they're so widely used as original equipment by so many leading engine builders.

For your every replacement need, there's an American Bosch Magneto precisely engineered for maximum efficiency at all engine operating speeds and loads. Moreover, American Bosch can serve you well with all the advantages of one of the world's largest and most efficient Service organizations. There's an AB Service Agency near you. Write today for application data on your high or low tension ignition engines. American Bosch, Springfield 7, Mass. A Division of American Bosch Arma Corporation.

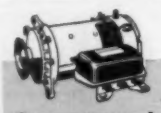
FOR OIL INDUSTRY HIGH & LOW TENSION SPARK IGNITED ENGINES

In drilling rigs, oil pumping stations, pipeline operations and gas-engine driven compressors . . . wherever they are in service in oil industry engines, American Bosch Magnetos and Pulse Generators deliver consistently dependable performance in month-after-month of continuous operation.



AMERICAN BOSCH

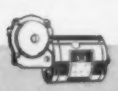
Automotive and Aviation Magnetos



Generators and Regulators

Components for Aircraft Engines

Small Electric Motors



Electric Windshield Wipers

Diesel Fuel Injection Equipment

LARGER SIZE RANGE

MIDWEST ELBOWS

IMPROVED DELIVERY

HEAVY WALL CARBON STEEL AND ALLOY

12" Long Radius
2¼" Wall Thickness
1¼% Chrome

20" x 10" Reducing
2" Wall Thickness
2¼% Cr—1% Mo.

STRAIGHT LONG RADIUS 90° ELLS

Nominal Pipe Size	Maximum Wall Thickness
36	1.250
30	2.000
26	2.000
24	1.500
20	1.375
18	2.250
16	2.125
14	1.750
12	2.000
10	2.000
8	1.750
6	1.000
5	.625
4	.750
3	.625
2½	.375
2	.500

These straight elbows can be furnished with LONG TANGENTS at no extra cost. All thicknesses less than those shown above are, of course, available.

The exclusive Midwest method of making all welding elbows from plate instead of tubing gives us a FLEXIBILITY OF MANUFACTURE that is much greater than by any other process. These heavy wall Midwest straight and reducing elbows are available in any material that can be secured as plate. The maximum wall thicknesses for which we now have equipment are indicated by the tables at left and right. And, because it is easier to get plate than tubing, better delivery is another advantage. Still another is the close tolerances inherent in our process.

Quality control goes beyond all code requirements. The longitudinal weld of every heavy wall elbow is completely X-rayed as standard procedure in our method of manufacture.

You will find it to your advantage to send us your inquiries.

REDUCING LONG RADIUS 90° ELLS

Nominal Pipe Size	Maximum Wall Thickness
30	2.000
26	*
24	2.000
20	2.000
18	2.000
16	1.500
14	1.750
12	2.250
10	2.000
8	1.750
6	1.000
5	.625
4	.750
3	.625
2½	.375
2	.500

Reductions to all nominal pipe sizes down to ½ large diameter. All thicknesses less than those shown above are, of course, available.
*Refer to factory.

4

MIDWEST PIPING COMPANY, INC.

Main Office: 1450 South Second St., St. Louis 4, Mo. • Plants: St. Louis, Clifton, N. J. and Los Angeles

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Right from the start . . .

FAST

POWERFUL

AMERICAN BOSCH
MAGNETOS

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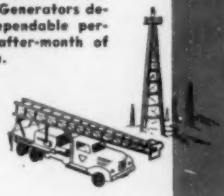
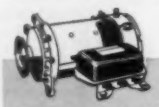


AMERICAN BOSCH

Automotive and Aviation Magnetos



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These straight elbows can be furnished with LONG TANGENTS at no extra cost. All thicknesses less than those shown above are, of course, available.

The exclusive Midwest method of making all welding elbows from plate instead of tubing gives us a FLEXIBILITY OF MANUFACTURE that is much greater than by any other process. These heavy wall Midwest straight and reducing elbows are available in any material that can be secured as plate. The maximum wall thicknesses for which we now have equipment are indicated by the tables at left and right. And, because it is easier to get plate than tubing, better delivery is another advantage. Still another is the close tolerances inherent in our process.

Quality control goes beyond all code requirements. The longitudinal weld of every heavy wall elbow is completely X-rayed as standard procedure in our method of manufacture.

You will find it to your advantage to send us your inquiries.

REDUCING LONG RADIUS 90° ELLS

Nominal Pipe Size	Maximum Wall Thickness
30	2.000
26	*
24	2.000
20	2.000
18	2.000
16	1.500
14	1.750
12	2.250
10	2.000
8	1.750
6	1.000
5	.625
4	.750
3	.625
2½	.375
2	.500

Reductions to all nominal pipe sizes down to ½ large diameter. All thicknesses less than those shown above are, of course, available.
*Refer to factory.

MIDWEST PIPING COMPANY, INC.

Main Office: 1450 South Second St., St. Louis 4, Mo. • Plants: St. Louis, Clifton, N. J. and Los Angeles

Sales Offices

ASHEVILLE (BOX 446, SKYLAND, N.C.)
BOSTON 27—426 FIRST ST.
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HOUSTON 2—1213 CAPITOL AVE.
LOS ANGELES 33—520 ANDERSON ST.
MIAMI 34—2103 LE JEUNE RD.
NEW YORK 7—50 CHURCH ST.
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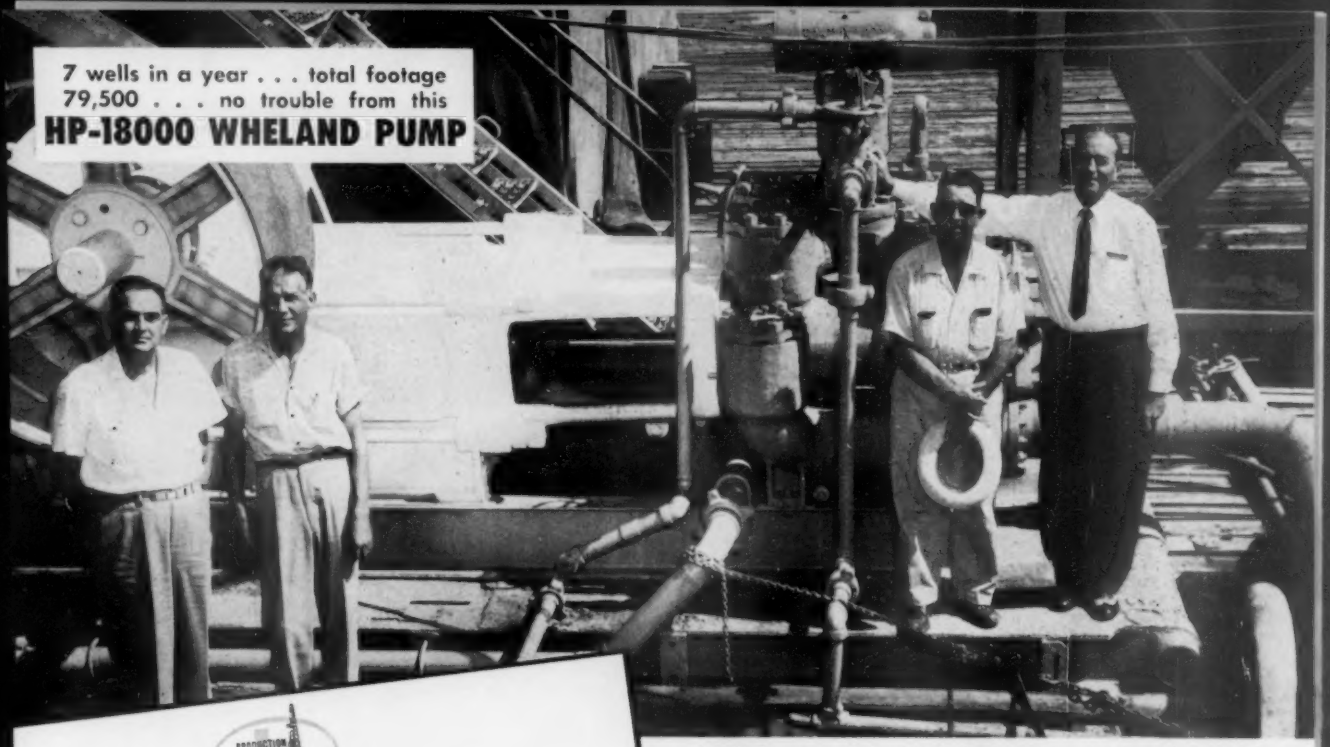
STOCKING DISTRIBUTORS IN PRINCIPAL CITIES

7675

7 wells in a year . . . total footage 79,500 . . . no trouble from this

HP-18000 WHELAND PUMP



Installation view of the Wheland HP-18000 owned by Oil Production Maintenance, Inc., Houston, Texas. Left to right: Messrs. J. K. Butler, President; Tracy East, Wheland Serviceman; "Pop" Woods, Tool Pusher; Harris Lodge, Homco Salesman.

OIL PRODUCTION MAINTENANCE, INC.
1440 CHOCOLATE BAYOU ROAD -- P. O. BOX 14291
HOUSTON 21, TEXAS

September 13, 1956

Mr. Gordon P. Street, President
The Wheland Company
Chattanooga, Tennessee

Dear Mr. Street:

Oil Production Maintenance, Inc. owns and operates two Wheland power pumps. One is a HP-14000 Wheland and the other is a HP-18000. Both of these pumps have been in operation approximately twelve months. We have experienced no difficulty either with the power end or the fluid end of either of these pumps over this period of time. Both of these pumps have been operated within approximately ten per cent of their rated capacities for the full twelve months.

During the twelve months period, the rig which operates the HP-18000 Wheland has drilled seven wells. They have varied in depth from 10,500 feet to 15,000 feet. The total footage accumulated by this rig during this time has been approximately 79,500 feet. We hope, and have every reason for our belief, that the pumps will continue their efficient operation for several years to come.

Yours very truly,

OIL PRODUCTION MAINTENANCE, INC.

J. K. Butler

J. K. Butler, President.

JKB:ml

OWNS 2 WHELAND PUMPS here's the report!

DEPENDABLE OPERATION!

". . . every reason for our belief that the pumps will continue their efficient operation for several years to come."

HP-18000 7¾" x 18", 750 HP Nominal Input at 60 RPM. Discharge Pressure with 7¾" liner 1322 PSI; with 5½" liner, 2700 PSI.

HP-14000 7½" x 14", 350 HP Nominal Input at 60 RPM. Discharge Pressure with 7½" liner 838 PSI; with 5½" liner, 1627 PSI.

BULLETINS ON REQUEST

WHELAND ROTARY DRILLING MACHINERY

THE WHELAND COMPANY

CHATTANOOGA, TENNESSEE, U.S.A.

DRAW WORKS • SLUSH PUMPS • ROTARIES
CROWN BLOCKS • TRAVELING BLOCKS • SWIVELS

DOMESTIC DISTRIBUTORS: INDUSTRIAL SUPPLY COMPANY, INC.—Main Office: Wichita Falls, Texas • HOUSTON OIL FIELD MATERIAL COMPANY, INC.—Main Office: Houston, Texas • JONES AND LAUGHLIN STEEL CORPORATION, SUPPLY DIVISION—Main Office: Drawer 2481, Tulsa 2, Oklahoma.

EXPORT DISTRIBUTORS: LUCEY EXPORT CORPORATION—233 Broadway, New York 7, New York—Broad Street House, London, E. C. 2, England.

Lava rock licked by LORAIN Pipeliner

Digging deep through shot lava rock is just part of the job for this Lorain-50 Pipeliner on the 95-mile long section of 22-inch natural gas line Midwestern Construction Co. of Tulsa, Okla., is laying from Burley to Hot Spring. This is part of the line for Pacific Northwest Gas Line Corp. of Houston, Texas, that will run from the San Juan Basin to Seattle.

This dependable 1-yd. Lorain Pipeliner is just one of several sizes of Lorains available. Lorains in this class have many features that fit them especially to pipelining. Here are a few. New, 2-lever, "Metered-Air" operation is easier, faster and simpler — requires only 2 "Joy Stick" levers to apply "Air-Ease" power to all turntable operations. Operator retains full, normal "feel" of clutches. Here's a new concept in fingertip control. For crane, dragline and clamshell work, Lorain has introduced a boom of new square-tubular-chord design that is lighter, yet stronger, and permits increased lifting capacities and greater bucket ranges. The new available "Shear Ball" turntable mounting, requires no center pin or nut, no rollers to wear, no adjustments. This new innovation provides a smooth, rock-steady, "ball bearing" swing.

These are but a few of the latest Lorain advances that every pipeliner should investigate. Lorain Hoes are available in sizes from $\frac{3}{8}$ to $2\frac{1}{2}$ yds.—cranes from 7 to 75 tons. There is a wide selection of crawlers or rubber-tire carriers. Ask your Thew-Lorain Distributor to help you compare Lorains—feature for feature, when you are ready to add to your spread.

THE THEW SHOVEL CO., LORAIN, OHIO

How to cap a climax safely, economically

UNIBOLT
flow manifolds

More and more operators are requesting their Christmas tree supplier to furnish UNIBOLT Flow Manifolds because they are lighter in weight, stronger, economical and easier to maintain.

Employing standard UNIBOLT connections rather than flanges, the UNIBOLT Flow Manifold is many pounds lighter, yet the UNIBOLT design, which places more steel in shear, actually results in a higher factor of safety for the manifold.

The three parts of the manifold — UNIBOLT Tee or Cross, Adjustable Wing Valve, and Positive Choke Body — are pressure-tested as a unit and may be assembled in a number of combinations to best meet individual needs. They are furnished in regular forged steel or in high-chrome alloy for corrosive wells — 6,000, 10,000 and 15,000 lbs. test.

The manifold is completely salvageable, either as an assembly or as individual units. Since all of its connections are standard UNIBOLT design, each unit freely interchanges with any other UNIBOLT product of the same size and rating.

THORNHILL CRAVER CO.
P. O. BOX 1184 HOUSTON, TEXAS

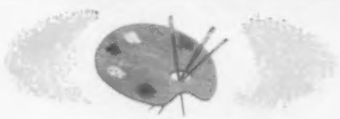
As time goes by, Rust-Oleum long wear assures lower cost over-the-years protection!

Rust-Oleum is distinctive as your own fingerprint. Accept no substitute.

Rust-Oleum's *unusual* resistance to extremes in rust-producing conditions—from sun and salt water to humidity, moisture, fumes, and weathering—assures you of lasting beauty. Long wear made possible, because Rust-Oleum's *specially-processed fish oil vehicle* works down through the rust into the tiny, microscopic pores in bare metal to STOP RUST. Important savings are realized by applying Rust-Oleum 769 Damp-Proof Red Primer *over rusted metal* after scraping and wire-brushing to remove rust scale and loose rust—as costly surface preparations are usually eliminated. See how Rust-Oleum can save you money . . . in your plant, or your home. Prompt delivery from Industrial Distributor stocks. Write for illustrated literature with color charts.

RUST-OLEUM CORPORATION • 2475 Oakton Street • Evanston, Illinois

RUST-OLEUM®



MANY ATTRACTIVE COLORS

Rust-Oleum finish coatings in Aluminum, White, Red, Gray, Green, Blue, Black, and Yellow provide double protection for tanks, machinery, girders, equipment, metal sash, wire fences, etc. Write for illustrated literature with color charts.

STOPS RUST!®

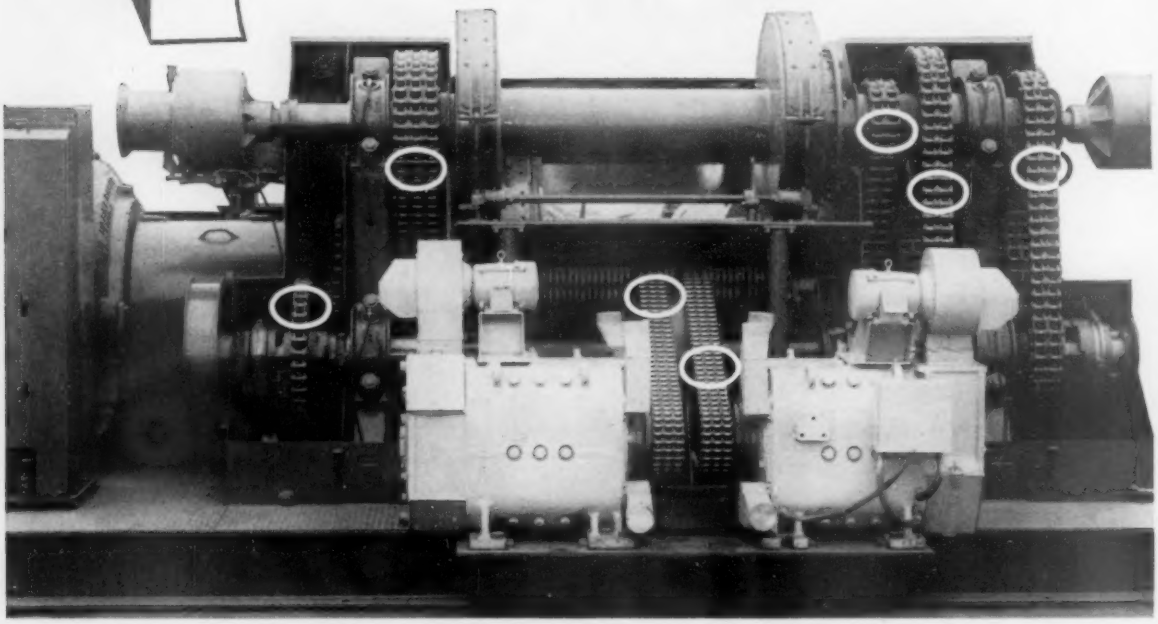
Rust-Oleum and Stops Rust are brand names and registered trademarks of the Rust-Oleum Corporation.

Radioactive tracing studies prove Rust-Oleum penetration through rust to bare metal.

REX®

7 lasting reasons why

this new EMSCO drawworks delivers longer service life



Every chain drive—seven in all—in this new Emsco EDES Drawworks is Rex Roller Chain.

Why Rex? Continental-Emsco Company knew from experience that *this* oil field chain would back up the extra speed and profits designed into this new drilling rig.

Greatly extended chain life does it. A revolutionary system of precision pitch control with fine degree tolerances assures *equal* load distribution over *all* parts. This way no one side plate is singled out for the load brunt ...no chance for costly early chain breakdown.

Here's another Rex reason: top-strength pin holes. A special manufacturing process imparts tremendous strength at these vital points.

What about disassembly? These rugged roller chains have "glide-fit" design...taking apart and recoupling are amazingly fast and simple. More money saved!

Whatever rigs you're working with, you can get more work out of your chains by specifying Rex Roller Chains. Talk to your supply store or to your Rex Field Sales Engineer. For literature, write CHAIN Belt Company, 4619 West Greenfield Avenue, Milwaukee 1, Wisconsin.

CHAIN BELT COMPANY

MILWAUKEE 1, WISCONSIN

Oil field offices: Dallas • Houston • Tulsa • Midland • Los Angeles • New York

New capacity!

The completely new Forward Control 'Jeep' FC-150—the first time a 4-wheel-drive Truck has so effectively combined maximum cargo capacity with exceptional maneuverability! New Forward Control design puts a 74" pickup box on an 81" wheelbase. And the FC-150 retains famous 'Jeep' ruggedness and versatility.

New maneuverability!

It's the world's shortest turning 4-wheel-drive Truck! For safer off-road maneuverability, it gives you up to 200% greater forward visibility. Powered by the engine that made 'Jeep' vehicles famous, the new FC-150 provides the extra traction of 4-wheel drive for off-road travel, shifts into 2-wheel drive for highway travel.

New style!

The new look and feel of tomorrow! The FC-150's Safety-View Cab combines beauty with utility. Its new wrap-around windshield is the largest in the 5,000 GVW class. There's plenty of extra leg and head room. Here is new styling, comfort, convenience and safety all in today's most advanced 4-wheel-drive Truck.

New 'Jeep' 4-Wheel-Drive Forward Control FC-150

Willys... world's largest makers of 4-Wheel-Drive vehicles

...other members of the famous 'Jeep' family:

Universal 'Jeep' | 'Jeep' Truck | 'Jeep' Utility Wagon

See 'Jeep' vehicles at your WILLYS dealer

exhaustive tests prove:

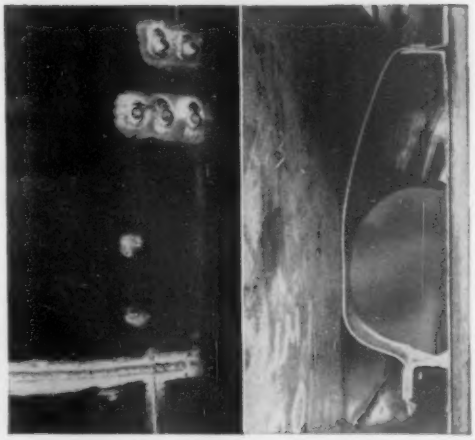
36 YEARS FROM TODAY

TUBESEALS* NOW IN FLOATING ROOF TANKS WILL OPERATE AS EFFICIENTLY AS THEY DO TODAY!

WE DOUBT this can be claimed for any other floating roof seal!

To determine the efficient life-expectancy of the Hammond Tubeseal in service, tests were made under the worst possible conditions to which a floating roof seal can be subjected. The Tubeseal was moved across very rough rivet heads, erection burrs and abrasive weld surfaces, for a total travel of 70,000 feet. This is equivalent to a normal wear of *more than 36 years in actual service.* Moreover, as the tests were run dry, there was the added disadvantage of the absence of lubricating effect normally created by wetted surfaces. Upon completion of these rigorous tests, the scuff band had only worn through the ribs and had barely penetrated through the material, leaving two-thirds of the stock intact; proof that the Tubeseal is unimpaired after traveling 70,000 feet.

The 36 year life-expectancy of a Hammond Tubeseal assumes no mechanical accident and is arrived at in the following manner: Each year a floating roof, in normal service, makes about 48 trips to and from top and bottom of tank. The roof of a 40 foot tank, therefore, will travel 1920 feet per year. Assuming 1920 feet of travel per year (based upon full depth of travel) and applying our accelerated wear test, the Tubeseal will be serviceable for at least 36 years 5½ months.



THE TUBESEAL TEST:

total travel	70,000 feet
travel over vertical weld	46,400 feet (on same line)
Horizontal welded seam crossed	21,200 times
Flat head rivets crossed	63,600 times

CONDITION OF TUBESEAL AFTER TEST: Scuff band had worn through ribs and had barely penetrated into the main material, leaving ⅔ of stock intact.

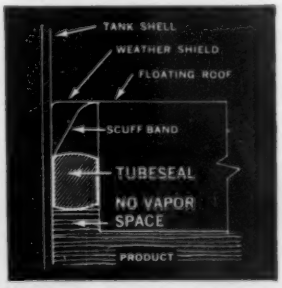
Tests were conducted dry with no aid of lubricant normally resulting from stored product.

Photos show projections used for test. Included are 16"of ⅜" horizontal weld—24" of sharp, irregular vertical weld—2 erection burrs—3 ¾" flat head rivets and 2 ¾" cone head rivets.

THE HAMMOND TUBESEAL
is the most efficient and positive seal known.

it features:

no moving parts
no mechanical maintenance
climate proof
non-corrodible
can operate to bottom of tank or above the top
no vapor space below the seal
entire circumference has tight seal under pressure at all times
longer working life expectancy



NO ROOM FOR VAPORS
NO EVAPORATION
NO CORROSION

**patented* *Write for bulletin TS*

HAMMOND TUBESEAL — THE MOST EFFICIENT AND POSITIVE SEAL KNOWN

HAMMOND IRON WORKS

WARREN and BRISTOL, PA. • PROVO, UTAH • CASPER, WYO. • BIRMINGHAM, ALA.

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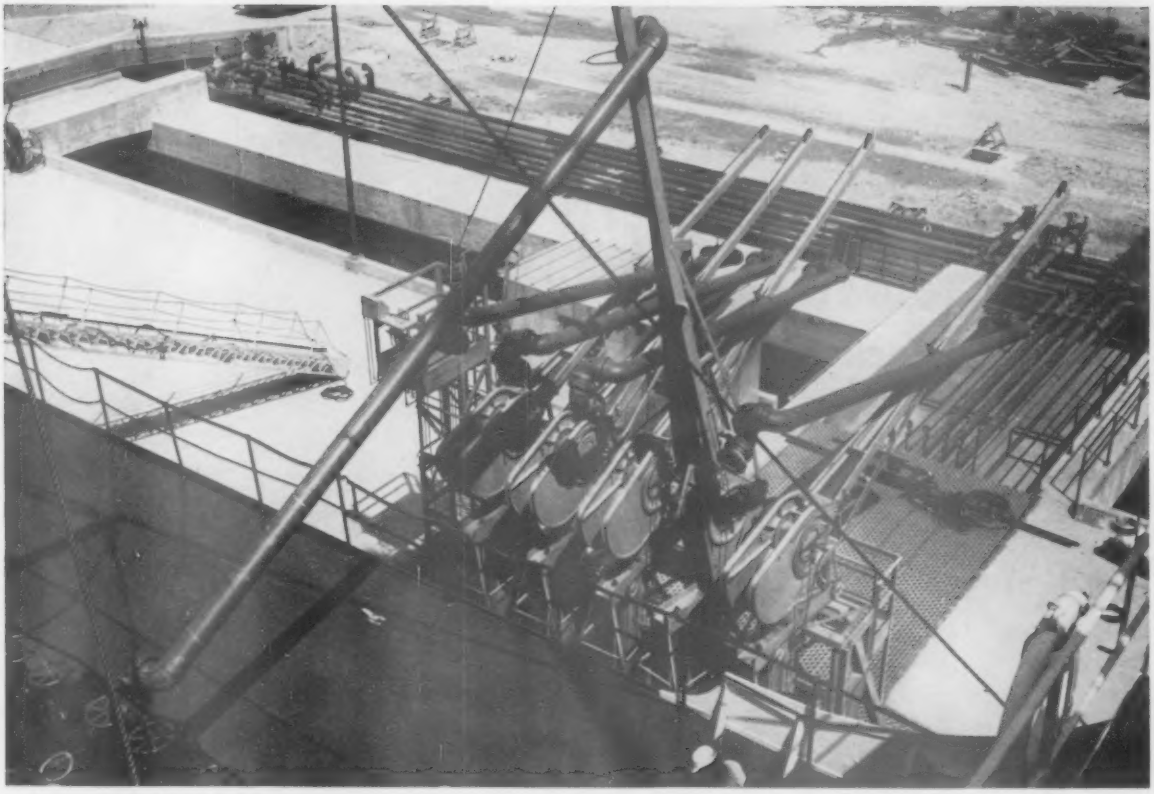
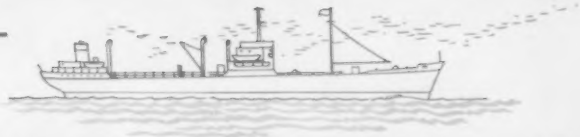


IN SHIPPING—



CHIKSAN MARINE LOADING ARMS

GIVE A MODERN DAY LIFT TO TANKER LOADING!

Hooking up hose lines to a tanker is often a rough, dirty, and sometimes dangerous task. However, loading drudgery is becoming just a memory wherever the new Chiksan Marine Loading Arm has gone into service. Heralded by many as the first basic improvement in the loading of marine tankers in over 30 years, the new Chiksan Loading Arm not only insures faster tanker turn-around time, but promises material savings of lost man-hours due to hose handling injuries, insurance and compensation premiums, and expensive rubber hose replacements. Savings within a decade, one customer estimates, will actually amount to the purchase price of a 5-arm unit. For descriptive literature, write Chiksan, Brea, California.

Where once a crew of seven men labored for 30 minutes to hook up a rubber line, now one man operating hydraulic controls can swing a Chiksan Loading Arm aboard, for hook up, in less than a minute.

A SUBSIDIARY OF FOOD MACHINERY AND CHEMICAL CORPORATION

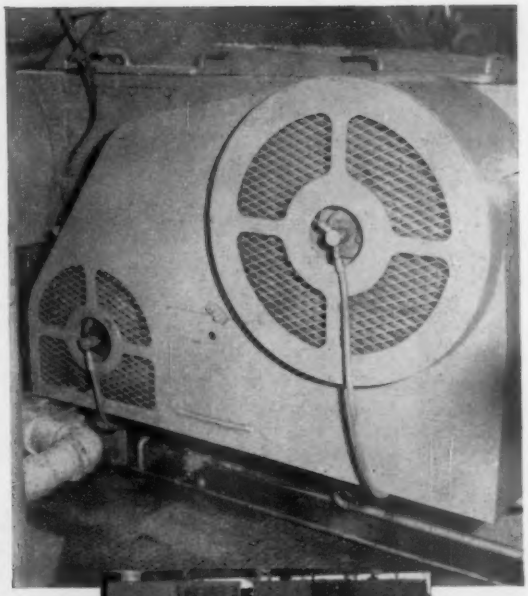
fmc CHIKSAN

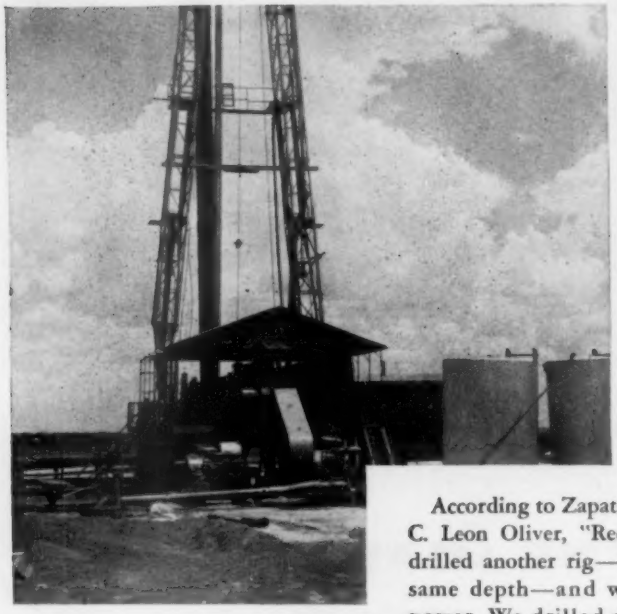
Please address: Dept. 31

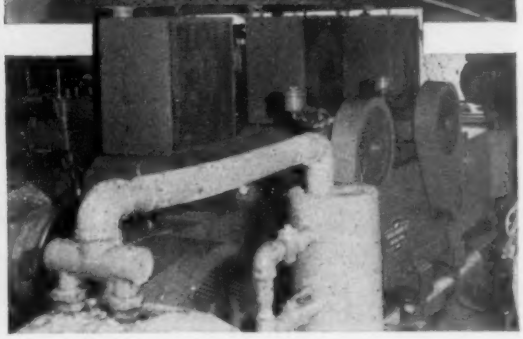
CHIKSAN COMPANY—BREA, CALIFORNIA • CHICAGO 5, ILLINOIS • NEWARK 2, NEW JERSEY

Well Equipment Mfg. Corp. (Division), Houston 1, Texas • Subsidiaries: Chiksan Export Company • Chiksan of Canada Ltd.

Twin Disc-equipped rig drills 36,000 feet of hole in 6 months







During a recent six-month period, Zapata Drilling Company, working near Andrews, Texas, drilled six holes for an approximate total of 36,000 feet.

This impressive performance came from a Brewster N-75 drilling rig, powered by three 400-hp Waukesha Model LRORB gas engines—driving through *three* Twin Disc Model HUD Disconnecting Fluid Power Take-Offs. The drawworks is equipped with four Twin Disc Model PO Air Clutches—a Model PO-324 as the high drum clutch, a Model PO-330 as the low drum clutch, a Model PO-224 as the master clutch and a Model PO-218 as the rotary clutch.

According to Zapata's tool pusher, C. Leon Oliver, "Recently we outdrilled another rig—drilling at the same depth—and with the same power. We drilled our hole in 34 days, while it took the other rig 59 days. The difference was that the other rig was equipped with *mechanical* clutches.

"We were also able to cut our bit cost by *more than one-third* because of the smooth running of our rig through the Twin Disc Fluid Drives."

The Twin Disc HUDs dampen out starting shocks and sudden overloads . . . prevent engines from lugging and stalling and *reduce impact shocks up to 70% on both driving and driven equipment*, thus greatly lengthening the work life of the rig, while slashing maintenance costs.

Twin Disc Model PO Air Clutches provide higher torque capacity (up to 126,600 lbs. ft.) . . . more compact installation . . . faster, smoother operation under all conditions . . . positive, quick release—no seal drag—built-in pressure release valves.

For complete information on how Twin Disc Model HUD Disconnecting Fluid Power Take-Offs and Model PO Air Clutches will make hole faster—*at less cost per foot* in your present or future rigs, phone your nearest Twin Disc Factory Branch . . . Tulsa: Enterprise Building, Sixth and Boston, GIbson 7-1578. Dallas: 1511 Turtle Creek Boulevard, RIverside 3014. Los Angeles: 2950 Leonis Boulevard, LOgan 8-3309.

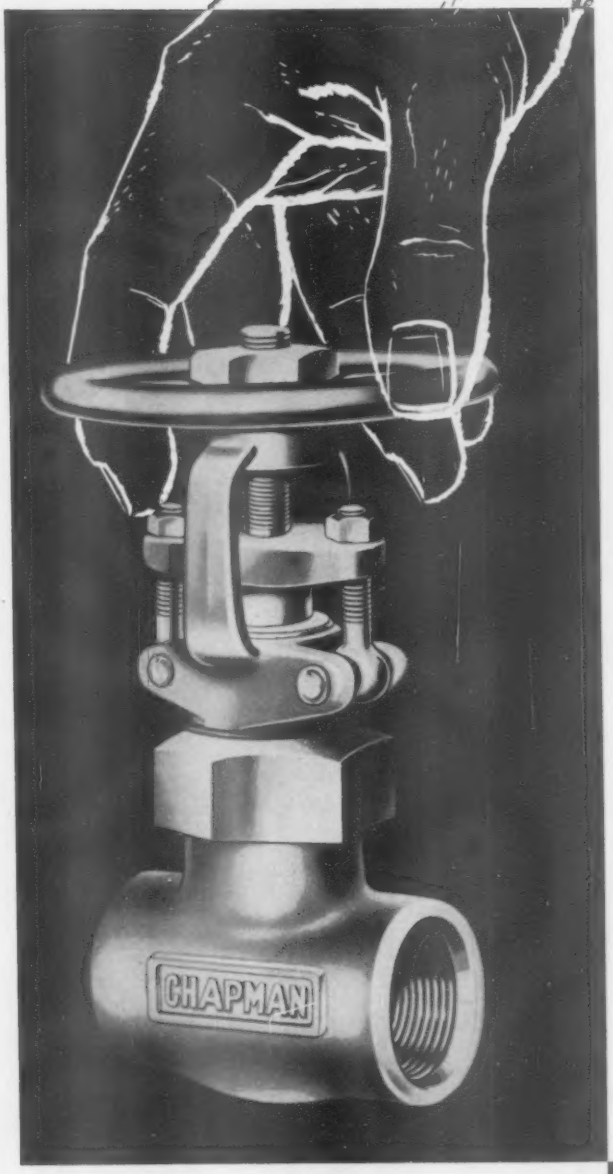
TWIN DISC

TWIN DISC

Friction Clutches and Fluid Drives

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois

TURN ON PERFORMANCE
...Turn off your Costs!



CHAPMAN LIST 960
Forged Steel Gate Valves

This is an open and shut case of top performance and lowest maintenance. To begin with, the wedge faces on Chapman List 960 are *super* hard. In fact, they're hardened to 800 Brinell by Chapman's *exclusive Malcomizing process.* They can't seize. They can't gall. The seat rings are hardened stainless steel. They last longer and, when necessary, they're very easy to replace.

There are no full-pressure repacking difficulties. Bolted follower on the outside screw rising stem design has no threads that are exposed.

Is it any wonder there are more Chapman List 960 valves on more jobs than any other small forged steel gate valve? They stand up perfectly under conditions ranging from 380 psi at 1000°F to 2000 psi at 100°F. You use Chapman List 990 valves for higher pressures. Sizes for List 960 are from ¼″ to 2″. You can have rising stem with yoke or rising stem with inside screw. And the Bonnet joint is either gasketed or ground metal-to-metal, depending upon your needs.

To take a good look at the ways to cut your valve costs, take a good look at our Catalog 10. Write, today, for your copy.

The CHAPMAN VALVE MANUFACTURING CO.
INDIAN ORCHARD, MASS.

NOW! A CATFORMING

Here's important news for refiners who are finding it increasingly difficult to meet today's higher octane requirements with present processes and catalysts. Atlantic offers an advanced Catforming catalyst designed to do a better, more economical job. The new catalyst combines ability to make higher octane quality products and an improved stability. These catalyst qualities mean greater process flexibility, and they are applicable in your present equipment. For full information on Catforming, write, wire or call The Atlantic Refining Company, P.O. Box 8138, Philadelphia 1, Pa.

NEW CATALYST

HIGHER GASOLINE OCTANES THROUGH PENTAFINING

You can convert the low-quality n-paraffins (C_5, C_6, C_7) in your gasoline pool to high octanes! Pentafining, the process developed by The Atlantic Refining Company, makes it possible. For full particulars, write today to The Atlantic Refining Company, P. O. Box 8138, Philadelphia 1, Pa.

it's the **CATALYST** that counts

ATLANTIC

Compatible Coexistence in Petrochemicals

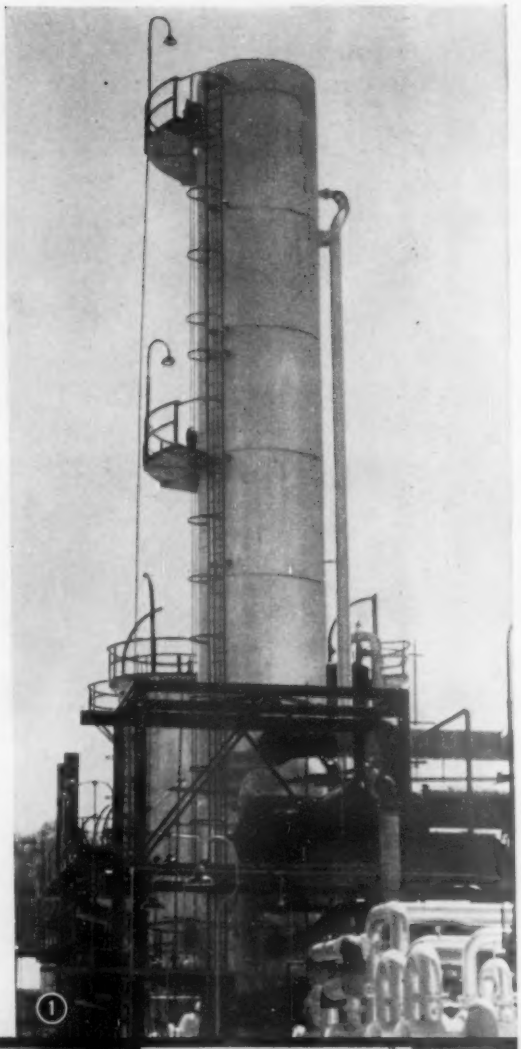
Compatible coexistence between highly corrosive chemicals and process or storage equipment is a requirement well known to Graver. In fact, Graver fabricating skills with a variety of alloys is why the petrochemicals industry, ever since its start, has turned to Graver for alloy process equipment, pressure vessels and storage tanks.

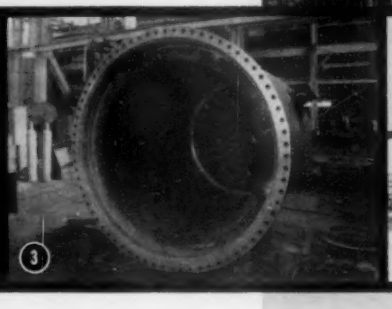
Graver fabrications in alloys are demonstrated by the petrochemicals installations illustrated here. The specifications are never too exacting, the project never too big to be fulfilled by Graver's country-wide manufacturing facilities.

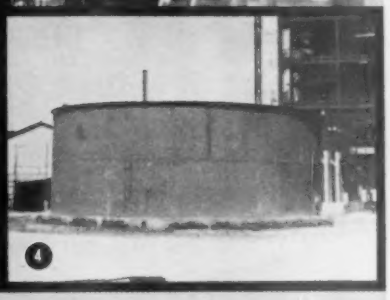
"Call in Graver" is a compliment the petrochemicals industry pays us with great regularity. May we show you the advantages of calling in Graver the next time you have a project requiring alloy fabrication?

Some Examples of Skilled Graver Alloy Fabrications

1. 9′ by 68′ stripper column for a petrochemical plant
2. 12′ by 31′3″ aluminum storage bin for a synthetic fiber plant
3. 4′6″ by 8′ solid stainless nitration vessel for a nitroglycerine plant
4. 41′ by 15′ field-erected Monel tank for acid residue







GRAVER TANK & MFG. CO., INC.

EAST CHICAGO, INDIANA

NEW YORK • PHILADELPHIA • EDGE MOOR, DEL.
PITTSBURGH • DETROIT • CHICAGO
TULSA • SANDS SPRINGS, OKLA. • HOUSTON
LOS ANGELES • FONTANA, CALIF. • SAN FRANCISCO

GRAVER®

Process Equipment • Pressure Vessels
Storage Tanks • Autoclaves • Digesters
Towers • Elevated Water Tanks
Oil Field Equipment • Weldments

Six choices of corrosion resistant tubes and sockets

4130 alloy steel tube with alloy steel tip and socket.

403 stainless steel tube with alloy steel tip and socket.

403 stainless steel tube with 416 stainless tip and socket.

316 stainless steel tube with alloy steel tip and socket.

316 stainless steel tube with 303 stainless tip and socket.

Monel tube with alloy steel tip and socket.

Tubes and sockets listed above are available in Type 100 Mastergauges which are designed for extreme service and pressures. Type 101 Mastergauges, for medium and high pressures, are available with:

4130 alloy steel tube, with alloy steel tip and socket.

403 stainless steel tube, with 416 stainless steel tip and socket.

403 stainless steel tube with alloy steel tip and socket.

STAINLESS...from socket to tip

Another Marsh development! The superlative Mastergauge is now available with stainless and alloy steel bourdon tubes. Try to find a corrosive service that isn't covered by range of materials listed above.

Tube, socket and tip—every part subjected to a corrosive medium—are fused into one piece by the "Connoweld" process . . . the exclusive process that distinguishes the Marsh Mastergauge from all other gauges.

Whether you need a gauge for corrosive service or any other critical application, Mastergauge is the one correct answer. It gives you the leak-proof Connoweld construction, the stronger, more durable copper-clad Marshalloy case, the precision Mastergauge movement, the "Recalibrator" to preserve its unmatched accuracy. Ask for data covering your specific gauge needs.

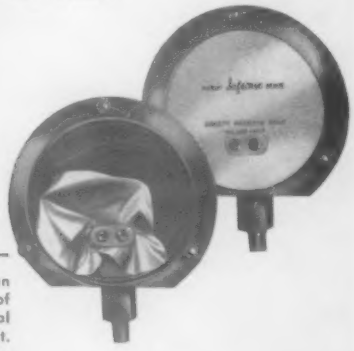
MARSH INSTRUMENT CO. Sales Affiliate of Jas. P. Marsh Corp. **Dept. L, Skokie, Ill.**
Marsh Instrument & Valve Co. (Canada) Ltd. 8407 103rd St., Edmonton, Alberta
Houston Branch Plant: 1121 Rothwell St., Sect. 15, Houston, Texas

MARSH GAUGES

"THE STANDARD OF ACCURACY"

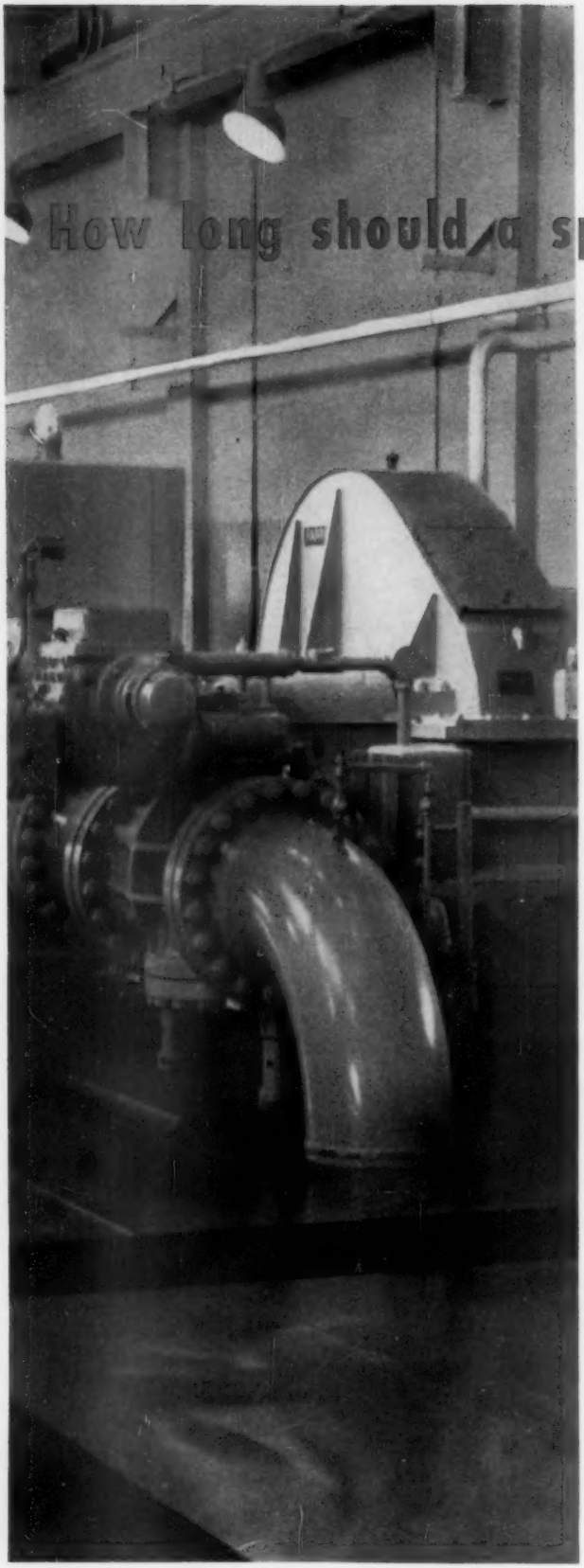
Stainless steel tube in the new SAFECASE

Here is a great combination . . . Marsh Mastergauge with corrosion resistant bourdon tube in the revolutionary Marsh Safecase . . . everything it takes for corrosive service where a surge of overpressure can occur.



Explosive force merely opens safety back—

Photo shows result of laboratory test in which gun cartridge was discharged in rear compartment of Safecase. Thin, tough back yields to abnormal pressure, but cannot be dislodged by blowout. Front of gauge remains intact, protected by heavy metal barrier.



How long should a speed increaser last?

True, there is no firm and fast rule for predicting how long a speed increaser will last in pipeline service. There are, however, some dependable clues. Most practical of all is performance under actual operating conditions.

How do Farrel speed increasers measure up when this service yardstick is applied? The answer is on record: Since 1932, when the first of these units was placed in operation, not one has ever been taken off the job. *This indicates that the life expectancy — or average service life — of a Farrel speed increaser is not less than 25 years!*

Design features tell the story. For example, teeth are continuous across the full face width of each gear — paying off in bonus strength and load-carrying capacity. Oversize shafts guard against torsional deflections under peak torque variations. Shafts are mounted in husky, precision-finished bearings. The rigid housing preserves original alignment of moving parts.

When you're in the market for speed increasers, remember the extra stamina that's built into every Farrel unit. It's your assurance of long-range speed-increasing economy.

In the meantime, send for a copy of bulletin 448-A.

FARREL-BIRMINGHAM COMPANY, INC.

ANSONIA, CONNECTICUT

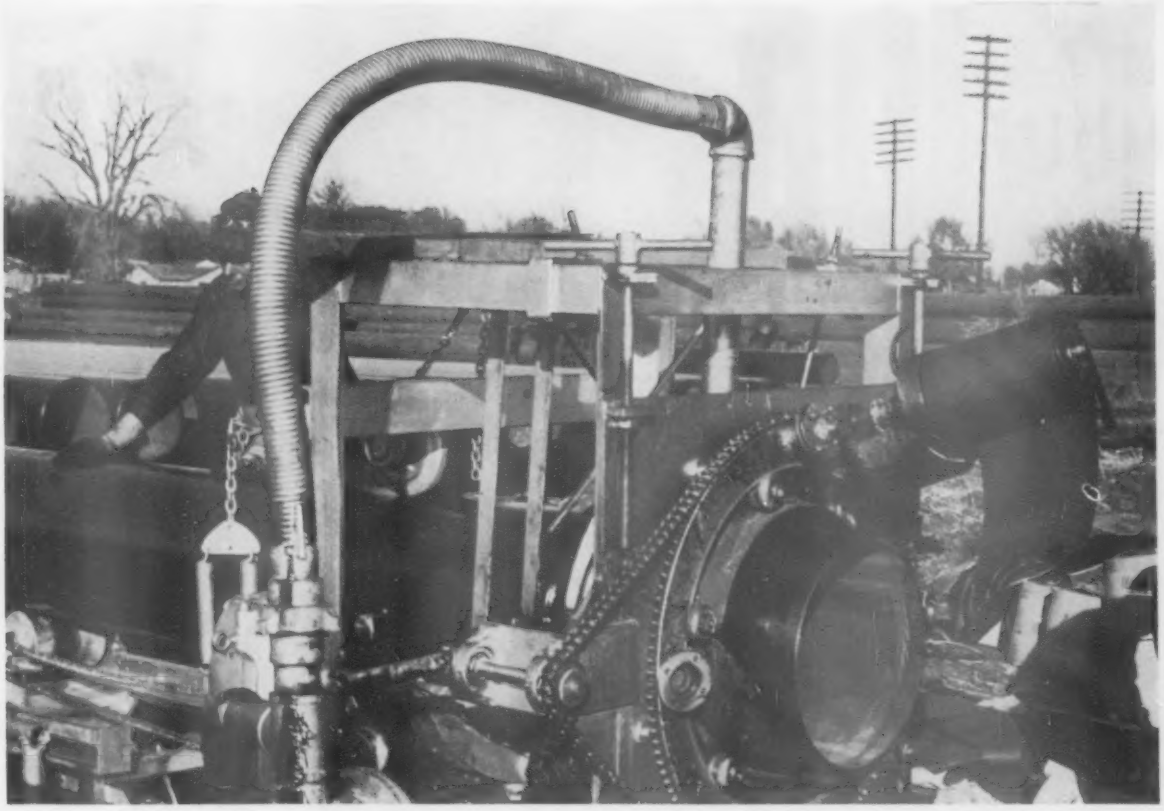
Plants: Ansonia and Derby, Conn., Buffalo and Rochester, N. Y.
Sales Offices: Ansonia, Buffalo, Boston, Akron, Ann Arbor (Mich.), Chicago, Minneapolis, Fayetteville (N. C.), Los Angeles, Salt Lake City

OIL FIELD REPRESENTATIVES

Hercules-Lupfer Engine Sales Co., 124 N. Boston St., Tulsa 1, Okla.
V. W. Osborne, 860A M&M Bldg., Houston 2, Texas
European Office: Piazza della Republica 32, Milano, Italy

Farrel-Birmingham®

FB-1109



PENFLEX PUTS A *FLOW* IN HOT TAR... WRAPS UP A TOUGH CONVEYING JOB

Hot tar in a steady flow . . . severe weather conditions . . . plenty of vibration . . . no leaks allowed . . . that's the job Penflex heavy duty interlocked 4" tubing performed on this pipe wrapping machine. Penflex metallic tubing is tight as a pipe but flexible—rugged, leakproof, heatproof, assures safe transmission of tar, oil, air, gas, volatiles and granular material. Defies constant flexing, vibration, crushing, kinking and abrasion.

Penflex has proved its peak efficiency in all parts of the petroleum industry—drilling rigs, pipeline laying, refinery stills, storage tank connections, and on truck, tankcar and ship unloading.

Write for "Flexineering" in the petroleum industry as your guide in buying and using Penflex interlocked and corrugated tubing . . . Penflexweld, the high pressure tubing for service where leaks are fatal. Your copy free.

Pennsylvania Flexible Metallic Tubing Company, Inc., 7213 Powers Lane, Philadelphia 42, Penna. • *Branch Sales Offices:* Boston New York • Chicago • Houston • Cleveland and Distributors in Principal Cities

flexineering by

PENFLEX

HEART OF INDUSTRY'S LIFELINES

FLEXIBLE TUBING, AUTOMATIC BARREL FILLERS, PNEUMATIC RIVET PASSERS, ACCESSORIES AND FITTINGS

why 100% WAUKESHA

Harry J. Schafer
President
SCHAFER DRILLING CO.
can tell you

SCHAFER DRILLING COMPANY

Liberty Bank Building
OKLAHOMA CITY, OKLAHOMA
Tel. REgent 9-1607

Harry J. Schafer, President

November 1, 1956

Waukesha Motor Company
Waukesha, Wisconsin

Gentlemen:

In my many years as an Oil Producer, I have used almost all makes and types of applicable engines on my wells that were "on the pump." Through the years Waukesha engines have done the most all around satisfactory job for me. I also noticed that the large majority of drilling contractors, drilling wells for me, had Waukesha engines on their drilling rigs.

Therefore, in 1952 when I decided to form my own drilling company, naturally I equipped my first rigs with Waukesha engines. Due to their excellent performance and economy of operation, I have had all of my rigs similarly equipped.

I am proud to say that we are a 100 per cent Waukesha customer. My congratulations on a truly fine product.

Very truly yours,

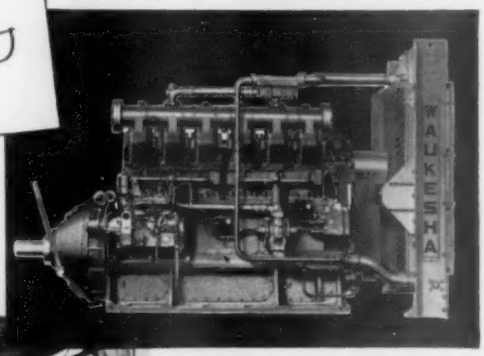
Harry J. Schafer

HJS:ah

WAUKESHA
Engines and Power Units up to 1135 hp

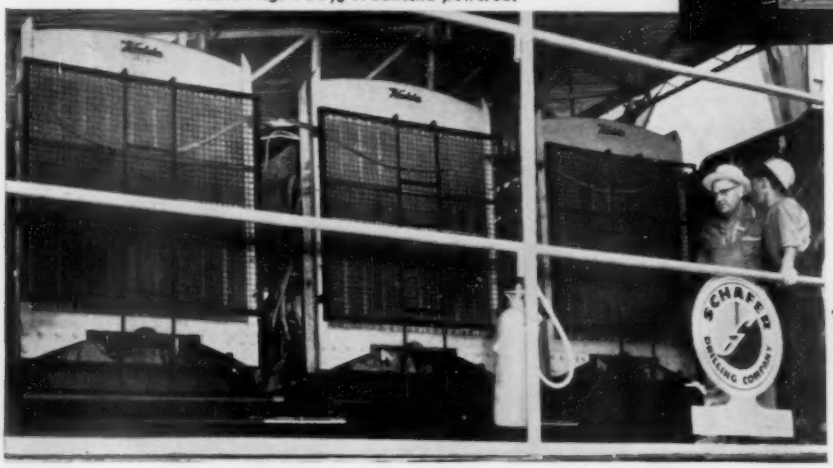
LP Gas • Natural Gas
Normal and Turbocharged Diesels

SEND FOR BULLETIN 1079



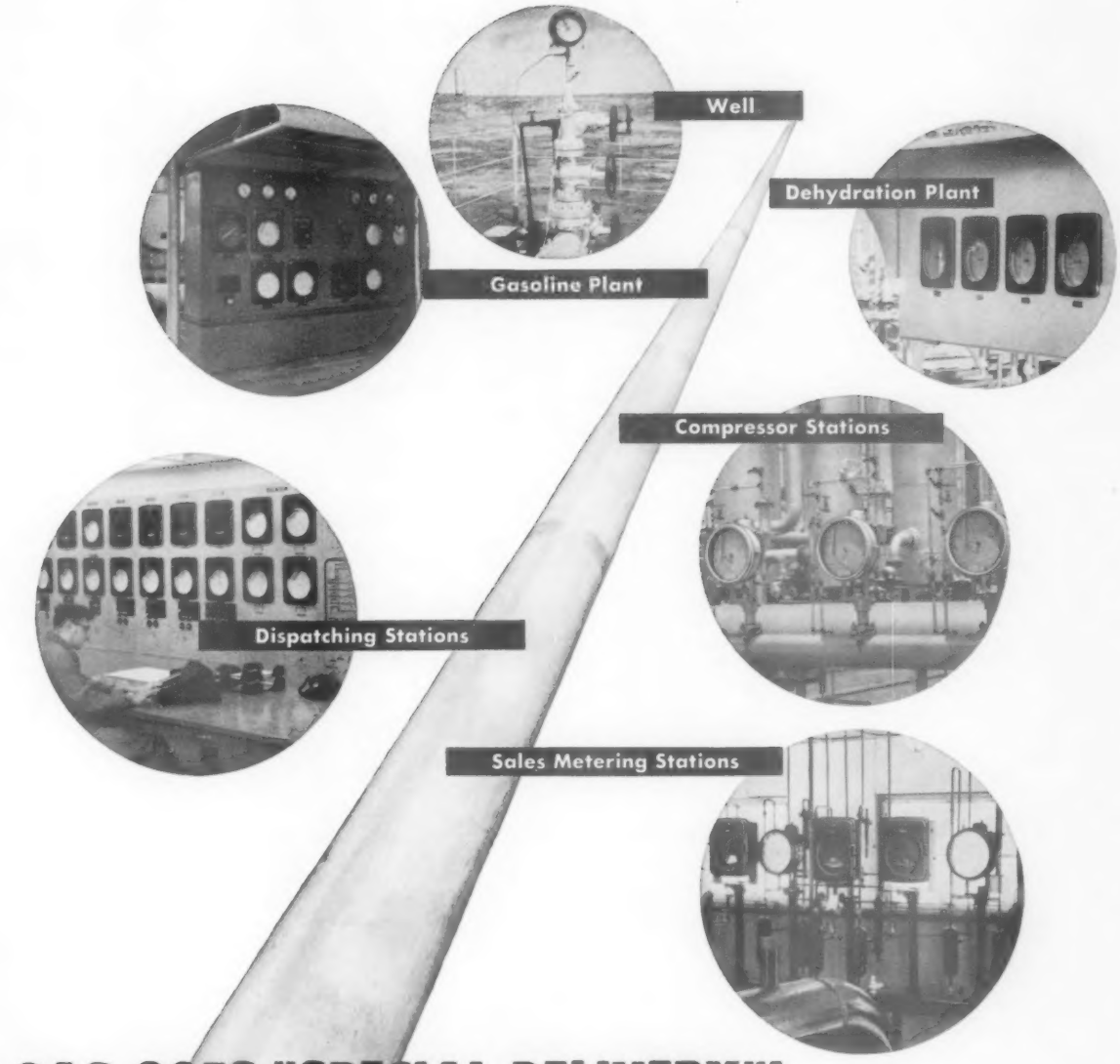
WAUKESHA Model LRORBU GAS POWER UNIT – counterbalanced crankshaft, high compression, overhead valve, six cylinders, 8½-inch bore x stroke, 2894 cubic inch displacement. *Send for Bulletin 1560.*

Schafer Rig No. 5, drilling at 8,111 ft., Cook No. 2 well, Cement, Okla. This rig, a Unit U-40, has two pumps. Toolpusher Jack (R. J.) Hinchey and Jim Saylor, daylight driller, look pleased with its 3 Waukesha LROU gas power units. Schafer Drilling Co. has seven rigs *100% Waukesha-powered.*



WAUKESHA MOTOR CO.
WAUKESHA, WISCONSIN
New York • Tulsa
Los Angeles

329



GAS GOES "SPECIAL DELIVERY"!

. . . under Foxboro Control

From well to city gate, natural gas flows more efficiently, with less supervision, in Foxboro-instrumented pipelines. At every stage — production — processing — transmission — delivery — Foxboro Instruments measure and automatically control gas movement and related operating variables. The resulting highly integrated control system keeps loads perfectly balanced . . . vital equipment constantly protected. For information on the latest methods of pipeline control, contact your nearby Foxboro Sales Engineer, or write The Foxboro Company, 601 Neponset Ave., Foxboro, Mass., U.S.A.

FOXBORO
Reg. U. S. Pat. Off.

Instrumentation for Pipelines

FACTORIES IN THE UNITED STATES, CANADA, AND ENGLAND

Right down the petroleum production line...

Macks HANDLE THE IMPORTANT JOBS

Like every other industry with challenging, big-time hauling jobs to do, the petroleum industry depends on its Macks . . . all the way from drilling wells to service station deliveries. Petroleum producers have found through long experience that their equipment travels at the lowest cost per mile . . . their products move at the lowest cost per gallon . . . in the Mack made for the job.

Whatever you have to haul, wherever you want to haul it, if it's an important job, it's a Mack-sized job. Users agree that no other heavy-duty truck is engineered to the tough, demanding jobs with the same thoroughness and precision as Macks . . . no other truck can be counted on for the same high-volume, high-efficiency hauling, year after year.

Want proof? Ask operators of Macks. Any Mack Branch or Distributor will gladly give you names.

FACTS ON MACKS

Did you know that Mack makes more of its component parts than any other truck manufacturer? Engines—both diesel and gasoline—frames, transmissions, gears, axles, cabs . . . all are products of the most precise mass production techniques in the automotive industry. This is one good reason why the familiar expression "Built like a Mack" symbolizes the utmost in strength and endurance.

Mack

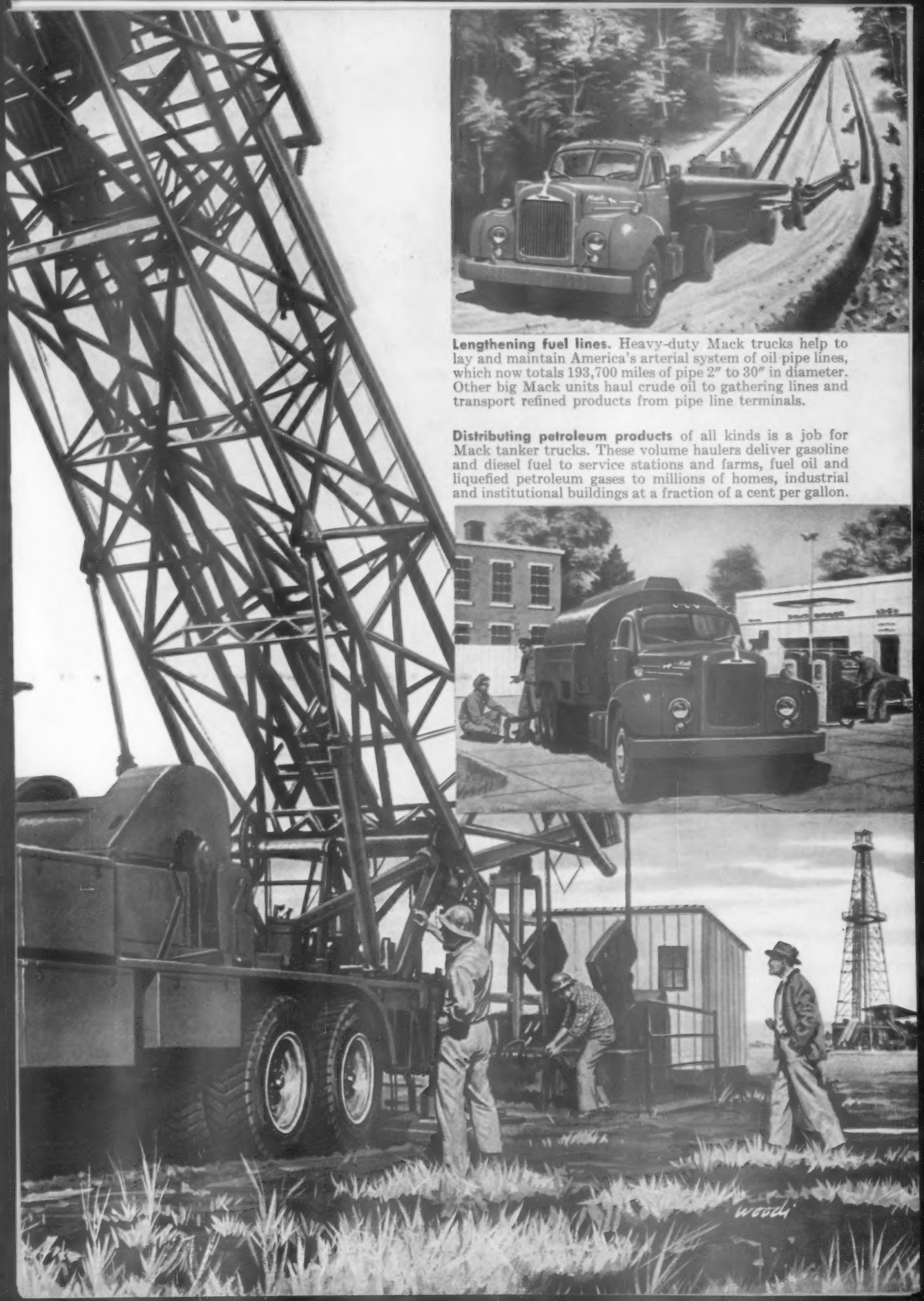
FIRST NAME FOR TRUCKS

Mack Trucks, Inc., Plainfield, New Jersey.
In Canada: Mack Trucks of Canada, Ltd.

"Have trucks, will travel" applies to today's fast-moving drilling crews. Large Mack diesels haul derricks and drilling equipment weighing as much as 100 tons to field sites, usually many miles from paved roads. Here trucks stay till the job is finished, often furnishing engine power for pumping or drilling.

Lengthening fuel lines. Heavy-duty Mack trucks help to lay and maintain America's arterial system of oil pipe lines, which now totals 193,700 miles of pipe 2″ to 30″ in diameter. Other big Mack units haul crude oil to gathering lines and transport refined products from pipe line terminals.

Distributing petroleum products of all kinds is a job for Mack tanker trucks. These volume haulers deliver gasoline and diesel fuel to service stations and farms, fuel oil and liquefied petroleum gases to millions of homes, industrial and institutional buildings at a fraction of a cent per gallon.



Let this "Visiting Fireman" train your men to fight fire . . . it could save your business

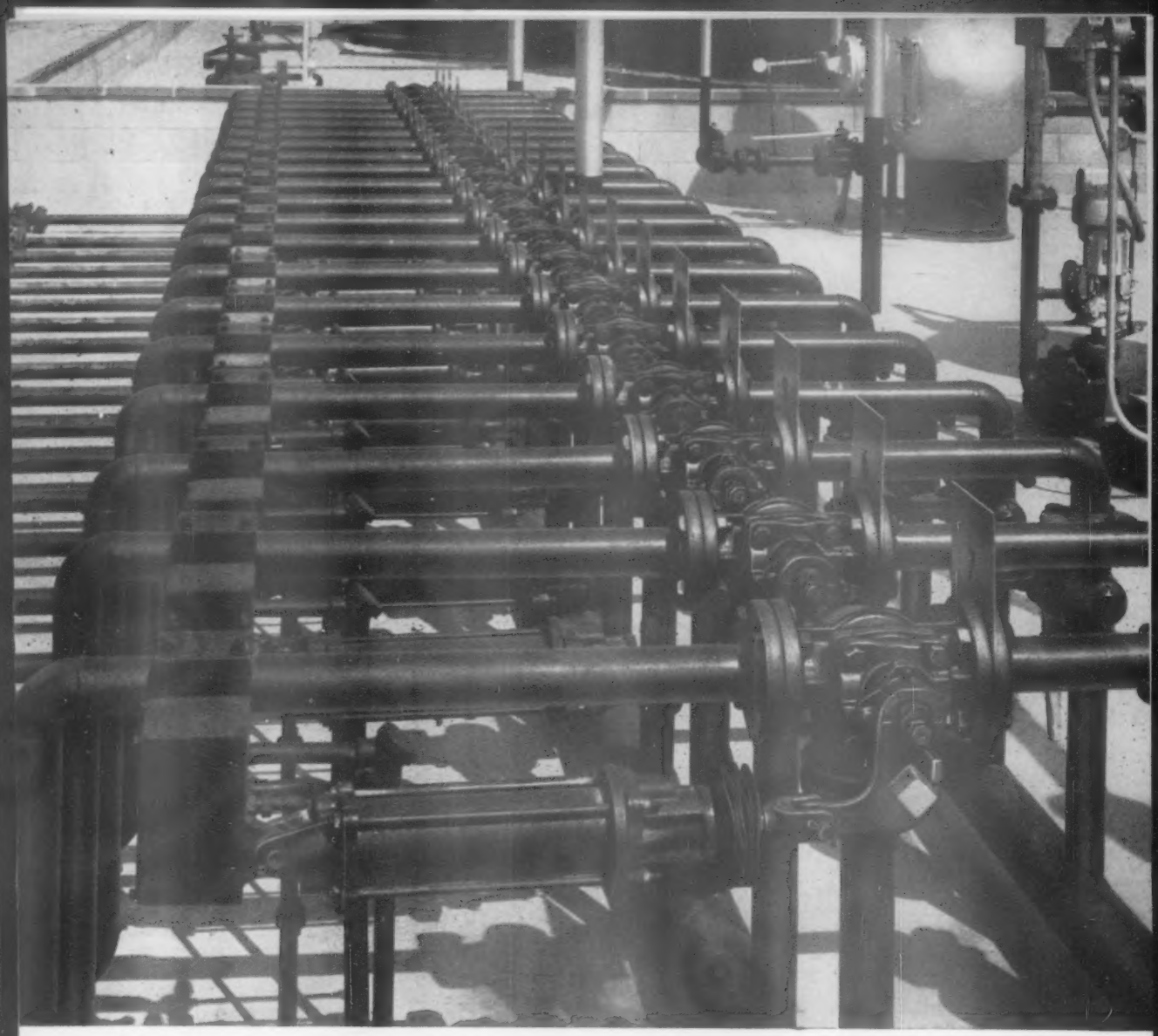
You have a *potential* fire-fighting team right in your plant. These would-be fire fighters *could save your business if fire struck unexpectedly*. All they need is training, the kind that will enable them to respond instantly and properly to any kind of fire emergency.

Ansul can provide this training for a group of your men just as it has for hundreds of its customers. And there will be no charge. It is just one of the "essential" services that Ansul provides for its customers.

Twenty years experience in the fire protection industry has proved to Ansul many times over that all the fire equipment in the world will not save your business *unless* trained hands are available to man that equipment. So, it is important to Ansul that you get *training* along with the fire equipment you buy. Only then will you experience the security that goes with having a complete fire protection program. Only then will you get what you really pay for, what you really need—*complete fire protection*.

You owe it to the life of your business to learn more about Ansul's in-plant fire training service. Get in touch with your local ANSUL MAN through the yellow pages of your phone directory, he will be happy to call on you and explain all of Ansul's customer services in detail. Or write to THE ANSUL CHEMICAL COMPANY, Dept. OG-1, Marinette, Wisconsin.

ANSUL



PUSH BUTTON MANIFOLD SAVES TIME, MONEY

Automatic production flow control, like the manifold above, is always fast, foolproof and economical when you use Rockwell-Nordstrom valves.

The positive shut-off, trouble-free dependability and money saving advantages of wrench and gear operated Rockwell-Nordstrom valves have been proven in the production fields for forty years. In automatic operation, you get the same cost-cutting advantages, and more. Because Rockwell-Nordstrom valves close with a lubricant-smooth quarter-turn, you do not need an extra heavy force to wedge-in the seat. This means that actuators can be simpler, less costly.

Insist on rugged, money saving Rockwell-Nordstrom valves for your next installation or valve replacement program. They cost no more to buy—often less—than ordinary valves, and are available in a complete range of sizes with electric, pneumatic and cylinder operators. See your nearest oil field supplier or write: Rockwell Manufacturing Company, Pittsburgh 8, Pa. *Canadian Valve Licensee:* Peacock Brothers Limited.

ROCKWELL-Nordstrom VALVES

Lubricant Sealed For Positive Shut-off

Humble's Corexit

Reduces Your Lifting Costs by Preventing Sub-surface Corrosion

Corexit treatments protect sucker rods and tubing against corrosion and hydrogen embrittlement, even in sour crude wells. Batched down the annulus, *Corexit* works rapidly to clean up your sub-surface equipment, to displace corrosive brine and loose scale from the metal surfaces. Then it builds up a tenacious and durable protective film on these cleaned metal surfaces to prevent further corrosion. Following the initial treatment, the use of a small amount of *Corexit* daily will maintain this tough protective film.

Consequently, you will find lifting costs lower, because *Corexit* prolongs the life of your equipment, and reduces the number of well pulling jobs.

For complete information on *Corexit,* call your nearest Humble wholesale plant in Texas and New Mexico, or write or phone:

HUMBLE OIL & REFINING COMPANY

HUMBLE

Technical Service
Sales Department
Humble Oil & Refining Company
P. O. Box 2180
Houston, Texas

NORDBERG

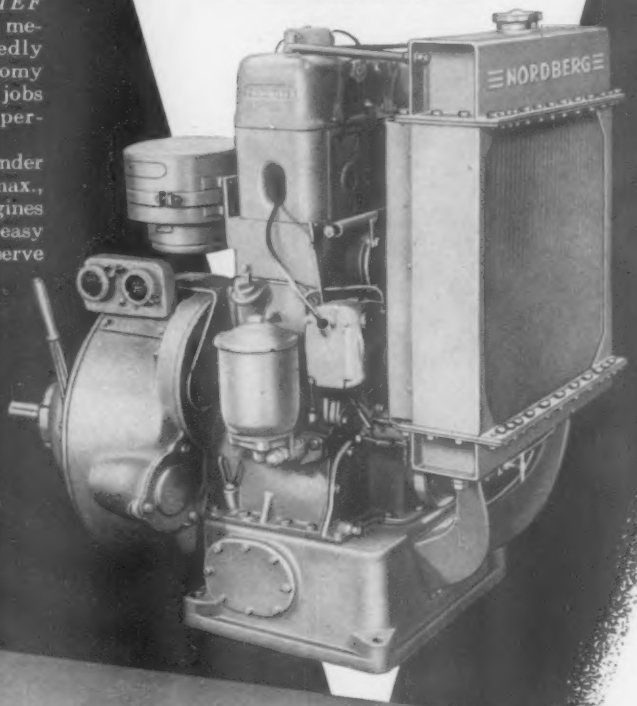
POWER CHIEF®

OIL FIELD ENGINES

FOR PRODUCTION PUMPING

Nordberg *POWER CHIEF* Gas Engines are low cost, medium speed units, ruggedly built for maximum economy on production pumping jobs where 'round-the-clock performance is a must.

Available in 1 and 2-cylinder sizes, up to 36 hp max., *POWER CHIEF* Gas Engines are simple to install and easy to maintain—ready to serve you 24 hours a day.



FOR RIG LIGHTING

More and more rigs are being lighted by Nordberg *POWER CHIEF* Diesel Generator Sets . . . because these sturdy units stand the gaff of continuous service, night after night, without constant attention and maintenance.

Built in 1, 2 and 3-cylinder sizes, from 10 to 45 hp, 6 to 30 kw—*POWER CHIEF* engines are available with special vibration-proof mounting for rig installation

NORDBERG MFG. CO.
Milwaukee, Wisconsin

SEND FOR NEW BULLETIN

© 1957, Nordberg Mfg. Co.

AVAILABLE AT YOUR LOCAL SUPPLY STORE — OR CONTACT THESE AUTHORIZED DISTRIBUTORS:

NORDBERG
POWER CHIEF
DIESEL and GAS ENGINES

4-157-0

FRED E. COOPER, INC., Tulsa, Oklahoma
BRANCHES: Houston, Odessa, Olney
SALES & SERVICE: Casper, Wyo.; Corpus Christi, Longview & Wichita Falls, Texas; Lafayette, La.; Wichita, Kansas.

IN-MAR CO., Wilmington, California

STEPHENS OIL FIELD REPAIR, Fairfield, Illinois

MEAD ENGINE & WELDING WORKS, Sterling, Kansas

CORNELISON ENGINE MAINTENANCE CO., INC., Seminole, Oklahoma

ROGERS DIESEL ENGINEERING CO., New Orleans, La.

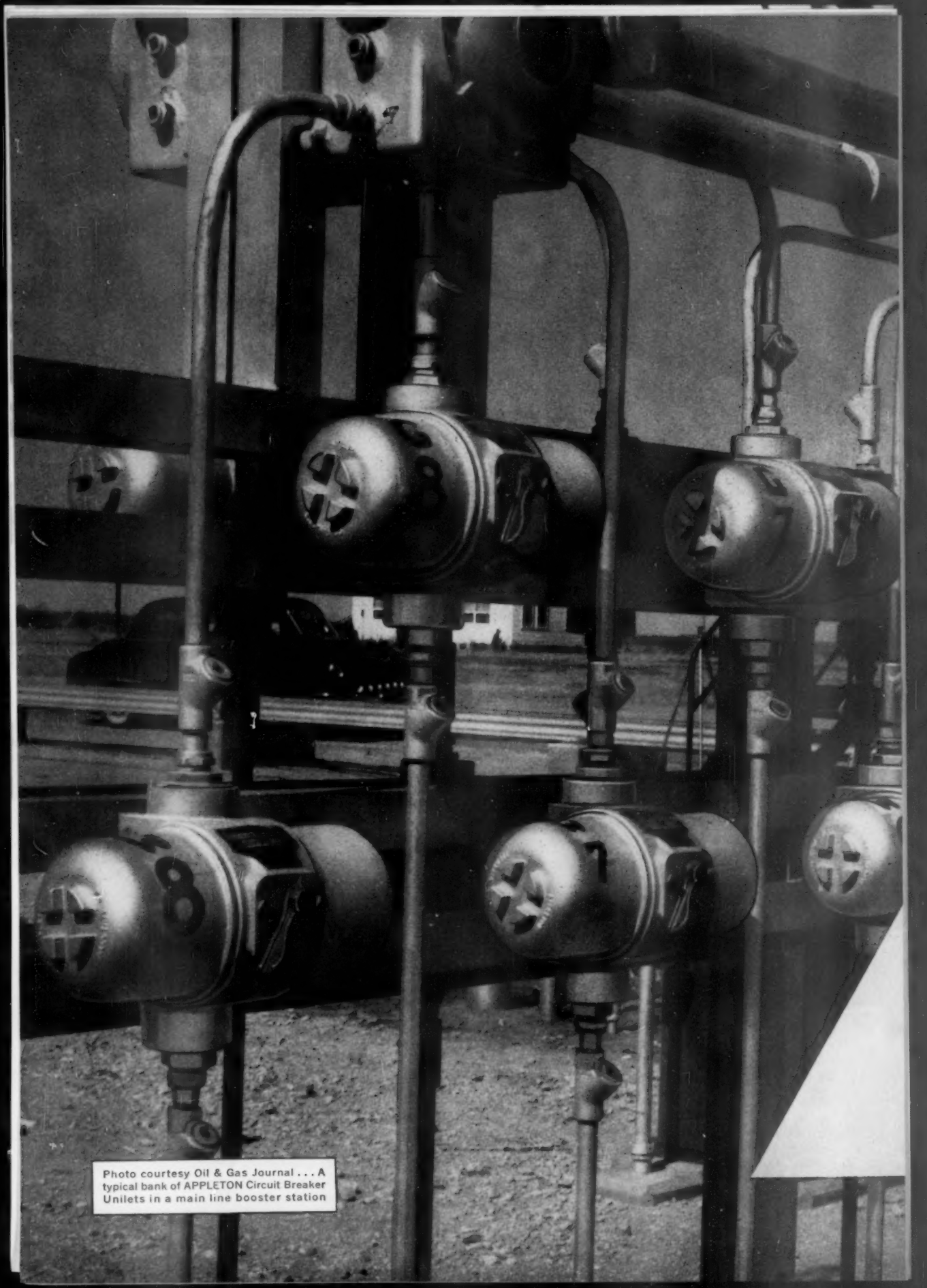


Photo courtesy Oil & Gas Journal . . . A typical bank of APPLETON Circuit Breaker Unilets in a main line booster station

The Choice of America's Leading Electrical Engineers

APPLETON

CIRCUIT BREAKER, MOTOR STARTER and COMBINATION MOTOR STARTER

UNILETS®

APPLETON Circuit Breaker and Motor Starter Unilets . . . your best choice for positive lasting protection against explosion, dust, and rain! Regardless of the installation, where absolute safety is required . . . APPLETON can serve you better!

7 REASONS FOR APPLETON SUPERIORITY
1. Full 7-thread explosion-proof protection. 2. Unmatched accessibility. 3. Compact, lightweight construction. 4. Unit may be added quickly, easily. 5. Flexible field set-ups with single and duplex male and female hub adapters. 6. Combinations meet U.L. requirements through approval of components. 7. First to be U.L. approved for banked circuit breaker grouping.

SOLD EXCLUSIVELY THROUGH SELECTED WHOLESALERS.
AN APPLETON ENGINEER WILL HELP YOU PLAN YOUR INSTALLATIONS WITHOUT OBLIGATION.

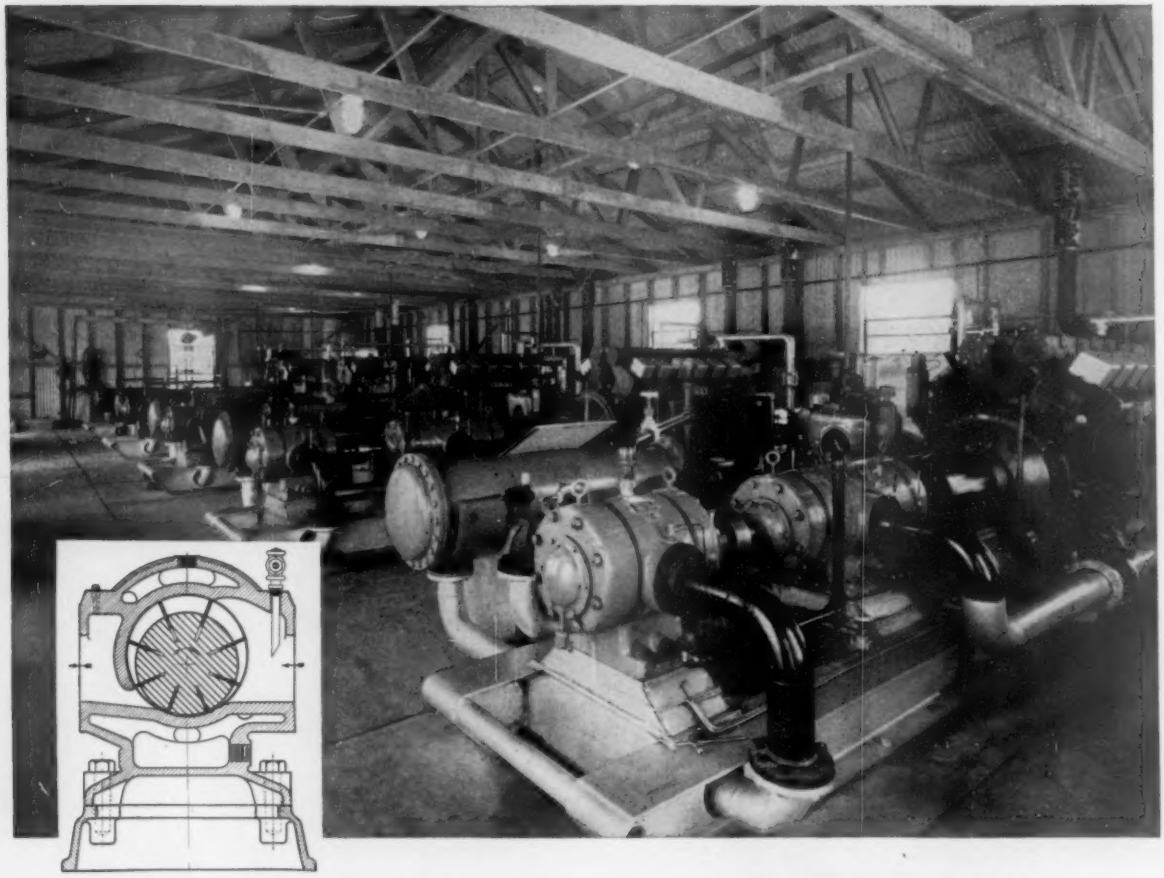
Also Manufacturers Of:

APPLETON ELECTRIC COMPANY • 1718 Wellington Avenue • Chicago 13, Illinois

APPLETON ELECTRIC PRODUCTS

Rely on APPLETON ... The Standard for Better Wiring®

The "Inside" Story Of Fuller Rotary Compressors



Here, near Borger, Texas, is an installation of five two-stage Fuller Rotary Booster Compressors whose total capacity is 8,875,000 SCFD of casinghead gas compressing from 10 PSIG to 125 PSIG.

This same type of Fuller Rotary is used to boost gas into main booster stations and can be, and is, used where field pressures drop due to depletion. This latter use avoids expensive construction and increasing line sizes.

These, and other Fuller Rotary Compressors, now in widespread use throughout the petroleum industry, both indoors and out, incorporate trouble-free design that assures their dependability.

SIMPLICITY

The elimination of compressor valves, crankshafts, pistons and numerous other moving parts greatly reduces the need for attention, adjustment and replacement.

PULSATION—FREE FLOW

The smooth flow resulting from rotary compression eliminates pressure fluctuations and simplifies metering problems.

SUSTAINED PERFORMANCE

The blades are held out by centrifugal force, automatically compensating for wear, thus maintaining new-machine efficiency and/or capacity.

OPERATION WITHOUT VIBRATION

The rotary principle permits a compressor design completely free of reciprocating parts, thus avoiding the basic source of vibration.

The complete details, as well as sizes, of Fuller Rotary Compressors and Vacuum Pumps are available in Bulletin C-5A. We'd like you to have a copy. Send for it.

VISIT OUR BOOTH 1664
PLANT MAINTENANCE SHOW
CLEVELAND JAN. 28-31

FULLER COMPANY, 132 Bridge St., Catasauqua, Pa.

SUBSIDIARY OF GENERAL AMERICAN TRANSPORTATION CORPORATION

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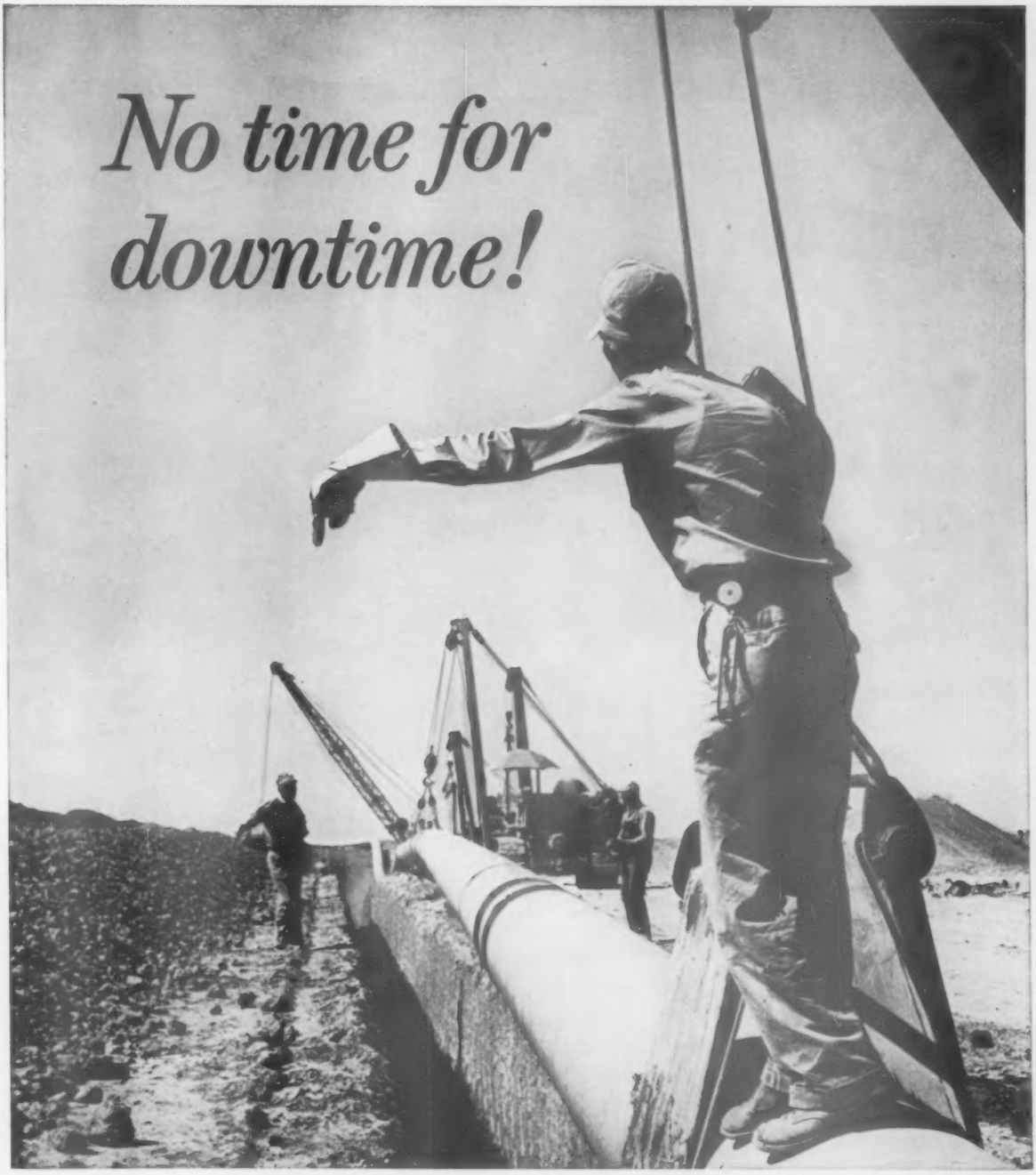
C-289
3026

PIONEERS OF HIGH-EFFICIENCY VANE TYPE ROTARY COMPRESSORS SINCE 1930

No time for downtime!



PACIFIC NORTHWEST PIPELINE CORPORATION PHOTOGRAPH.

Staying on schedule is absolutely essential on a pipe line job.

That's why so many pipe line builders depend on Kaiser Steel for quality pipe to meet API specifications—*delivered as scheduled.*

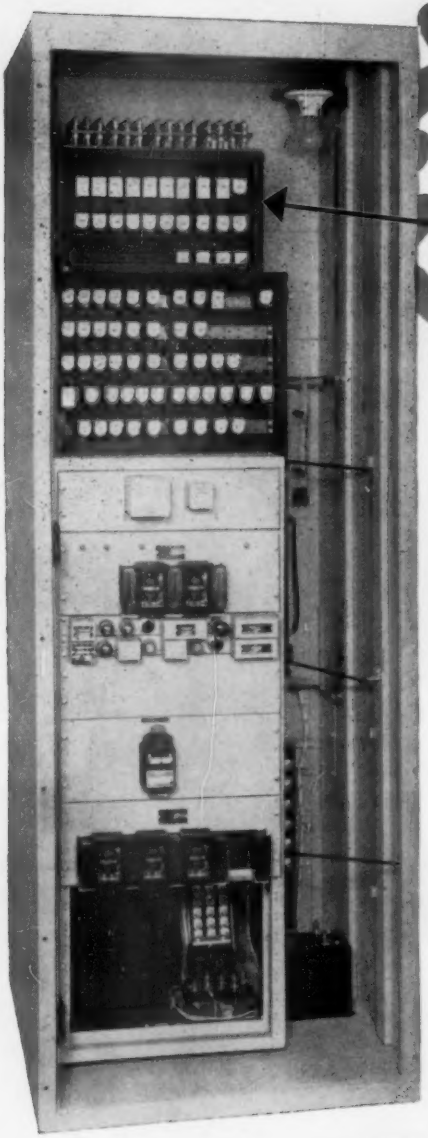
Next time you are ordering line pipe, specify Kaiser Steel Line Pipe. Rely on Kaiser Steel quality and service to add dollars to your operating profits.

Kaiser Steel

Steel Mill Products: plates • hot rolled strip and sheet • cold rolled strip and sheet • tin plate • continuous weld pipe • electric weld pipe • alloy and carbon bars • bar shapes • structural shapes semi-finished steels • pig iron • ingot molds • coke by-products • **Fabricating Division:** steel fabrication for construction, aircraft, missile and other industries • expanded fusion weld pipe reinforced concrete pipe • tanks • For specifications, write: **KAISER STEEL CORPORATION** • **Los Angeles** • **Oakland** • **Seattle** • **Portland** • **Phoenix** • **Denver** • **Tulsa** • **New York**

Millions of "heartbeats" prove the reliability of

UNION C.T.C. Centralized Transport Control



"HEART" OF THE SYSTEM . . . is the coding unit consisting of a group of relays which transmit all control codes to the field and receive all indication and digital information from the field.

A control system is only as good as its vital parts. That's why it's so important that every component meet the quality standards of the main system. For this reason, Union Switch & Signal designs and manufactures all the important parts that go into its centralized transport control systems.

The "heart" of the UNION System is the coding unit. This consists of a group of relays that transmit all the control codes to the field and receive all indications and digital information from the field. The design of these relays features extreme ruggedness and reliability. Service records in other applications show the relays are capable of millions of operations.

This is an example of the reliability that is built into the components used in the UNION C.T.C. System. It means that you can expect a UNION System to go to work and *keep on working* with the least possible maintenance cost. Write for a copy of our Bulletin SPL 1052 for complete information.

Quality First . . . TO LAST

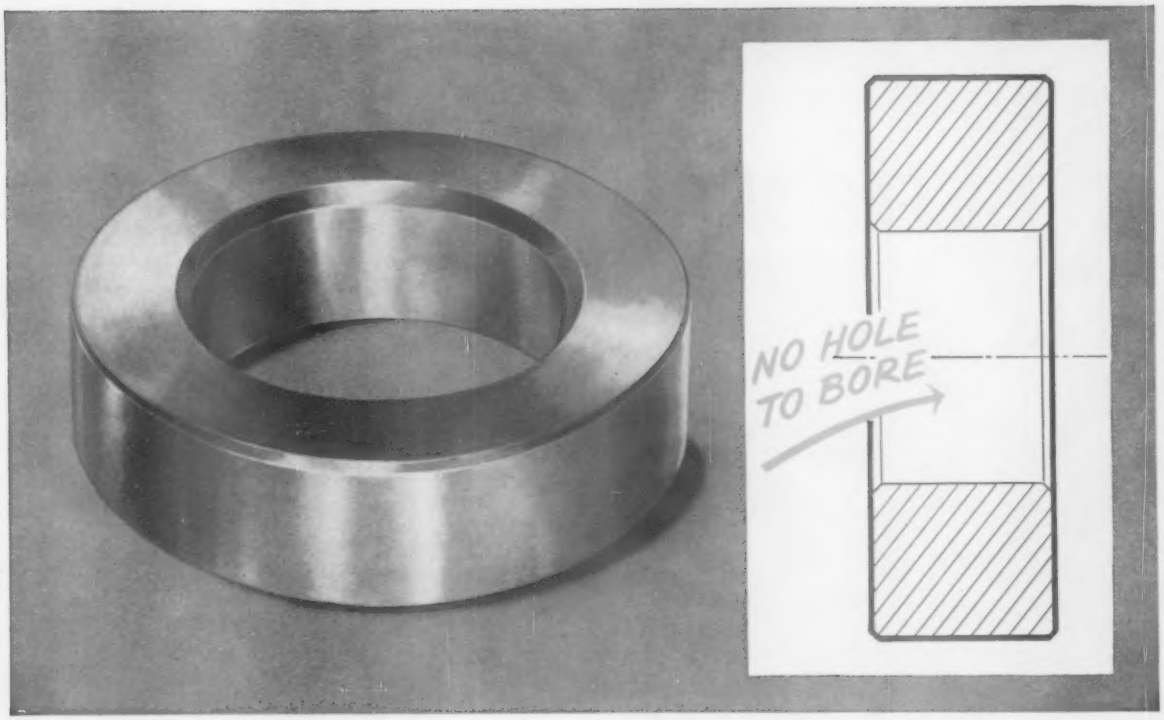
UNION Centralized Transport Control Equipment for the central office (back view). Uses unitized packages plug-connected for ease in handling.

GENERAL APPARATUS SALES

UNION SWITCH & SIGNAL

DIVISION OF WESTINGHOUSE AIR BRAKE COMPANY

PITTSBURGH 18, PENNSYLVANIA



Steps up gear blank production 300% by switching from bar stock to TIMKEN® steel tubing

AN engine manufacturer felt that his gear blanks were costing him too much to make. The center hole had to be bored out of solid bar stock. It took a whole hour to turn out 29 blanks. And a lot of steel was wasted in the process.

So the manufacturer discussed his problem with metallurgists of the Timken Company, experts in fine alloy steel. After study they recommended a change in production methods together with a switch to Timken® seamless steel tubing in place of bar stock.

With Timken seamless steel tubing, the center hole is already there. It doesn't have to be bored out. Finish boring was the engine maker's first production step. And with Timken steel tubing his gear blanks are now being turned out at 120 to 130 an hour—an increase of 300%.

Machining costs have been cut by more than half. And because the center hole is "built-in", no steel is wasted.

The files of the Timken Company contain records of hundreds of problems that have been solved by Timken fine alloy steel. If you have a tough steel problem, why not bring it to us? Wire, write or phone The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING

USERS SAY R/M HOSE AND BELTS

More Hole per Hose Lower Drilling Costs with RAY-MAN ROTARY HOSE!

Here's a rotary hose that stays with the rig. R/M engineered features lengthen the life of Ray-Man CBL Rotary Hose—more drilling for every dollar you invest. Special high-tensile steel cable wire reinforcement, precision wound, makes Ray-Man *stronger*, *safer* to handle . . . *easier* to transport and rig-up without accident. It has higher resistance to accidental crushing.

R/M's exclusive streamlined, built-in coupling with blow-out proof "Lip-Lok" Seal tightens under pressure and helps add to the drilling life of the hose.

For the highest safety factor, longest life . . . and lowest cost per foot drilled . . . put Ray-Man CBL Rotary Hose to work on your rig.

Write for Bulletin #6898

To Lower Your other Hose Costs Specify R/M VIBRATION, GEOPHYSICAL, SLUSH PUMP, RIG FLOOR HOSE . . . and OIL LOADING HOSE

GIVE YOU "*More Use per Dollar*"

R/M POLY-V® DRIVES Eliminate Belt Matching Problems!

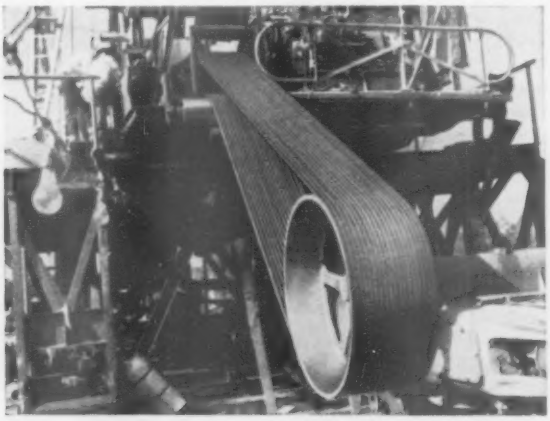
R/M's patented, new concept in power transmission employs a *single unit* across the full width of the drive sheave . . . *not* an assembly of V-belts which may vary in exact length. Belt matching problems don't exist . . . equipment downtime and belt replacement costs are reduced to a minimum!

Because of R/M Poly-V's unique single unit belt and specially designed sheaves, you can save drive space, too. Poly-V* Drive can deliver up to 50% *more* power in the *same* space as regular multiple belt drives . . . *equal* power in as little as ⅔ the space!

Only *two* cross sections of Poly-V Belt meet every requirement for heavy duty power transmission, as compared to *five* with ordinary V-belts. Poly-V cuts costly inventories to a new low! Ask an R/M representative for details.

Write for Bulletin #6638

**Poly-V is a registered Raybestos-Manhattan trademark.*



Now . . . CONDOR V-BELTS Length Certified!

R/M's new exclusive vacuum-sealed, moisture-proof packaging assures V-belt length control for users of Oil-field Condor V-Belts. Shrinkage or elongation in storage are eliminated. Belt length is *certified* from factory to field! R/M moisture-proof packaging saves downtime for belt matching and prolongs life of the "Smoothest Running V-Belts Made."

Write for Bulletin #7072

RM-720

BELTS • HOSE • ROLL COVERING • TANK LININGS • INDUSTRIAL RUBBER SPECIALTIES

MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

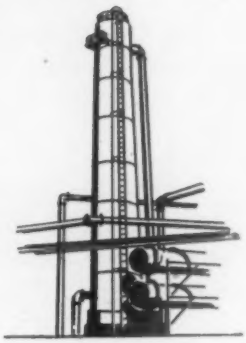
Other R/M products: Abrasive and Diamond Wheels • Brake Blocks and Linings • Clutch Facings • Asbestos Textiles • Mechanical Packings • Engineered Plastics • Sintered Metal Products • Industrial Adhesives • Laundry Pads and Covers • Bowling Balls

OAKITE *Maintenance* CLEANING

helps maintenance crews save time, cut costs, keep equipment operating efficiently

Specialized Oakite cleaning, descaling and related materials plus Oakite up-to-date methods are widely used in all branches of the petroleum processing industries. These specialized materials and methods . . . developed through more than 45 years of experience . . . are designed to provide you with the best in all round cleaning efficiency. What is more—all Oakite materials are backed by a binding guarantee. Your interests are fully protected.

Here are four maintenance jobs, typical of the type of many, Oakite is called upon to do every day of the year. These cleaning operations are fully covered in our free booklet "What Petroleum Men Should Know to Simplify Cleaning". Send for a copy.

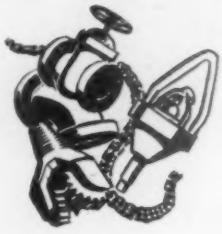


1 **TOWER CLEANING.** Oakite lists a wide variety of compounds for removing waxes, resinous products, iron sulfides, oxides and other deposits from bubble caps, trays, downcomers. Circulation method eliminates costly manual cleaning.

2 **HEAT EXCHANGERS.** Oakite offers specialized alkaline and acidic type compounds for removing oil, carbon from shell side; lime scale, rust from tube side. Cleaning is done "in-place".

3 **PAINT STRIPPING.** You can strip paint from storage tank exteriors using your own equipment to apply, recover and recirculate stripper. Oakite provides a complete selection of alkaline and solvent strippers.

4 **SALVAGE.** Oakite has simplified methods to make salvage profitable. They give you a choice of specially compounded materials for cleaning and rust-proofing tools, fittings, valves, chains, pumps, etc.



ON-THE-SPOT SERVICE. Whenever you have a ticklish problem of cleaning to solve you can get quick on-the-spot advice by reaching for your phone and calling your local Oakite Technical Representative. His services are available at all times. For full particulars drop a line to Petroleum Service Division of Oakite Products, Inc., 52E Rector Street, New York 6, New York.

SPECIALIZED INDUSTRIAL CLEANING

OAKITE

REG. U.S. PAT. OFF.

MATERIALS • METHODS • SERVICE

Technical Service Representatives in Principal Cities of U. S. and Canada

OAKITE PRODUCTS, INC.—General Office: 19 Rector St., New York 6, N. Y.

1000 BRINELL DURACASE TRIM...

Stops galling and erosion

Since the introduction of OIC's Duracase Trim, many forged steel valve specs are obsolete. This 13% chrome stainless steel trim with 1000 Brinell, case-hardened wedges and discs assures positive protection against even the simultaneous attack of the three valve-destroying agents—corrosion, erosion, galling.

OIC offers you a choice of two modern body-bonnet connections—union ring or bolted bonnet—on its entire forged steel gate, globe, angle, and check valve line.

In addition, gate valves offer a choice of standard-flow or high-flow body ports, both with 1000 Brinell wedges.

Step up your valve requirements to the modern high-quality standards reflected in OIC valves. Include OIC on your next specification.

For OIC forged steel valve specification literature, write for Forms No. 195 and 195-R.

THE OHIO INJECTOR COMPANY • WADSWORTH, OHIO

OIC VALVES

FORGED & CAST STEEL, LUBRICATED PLUG, BRONZE & IRON VALVES

ANY HOUR

day

or night...

You can obtain
Republic Hose
from your J & L Store

Stocked in the
Mid-Continent Area by
JONES & LAUGHLIN
SUPPLY DIVISION
P.O. Drawer 2481, Tulsa 2, Okla.,
and the J & L Store
in YOUR field.

REPUBLIC RUBBER DIVISION

LEE RUBBER & TIRE CORPORATION, YOUNGSTOWN 1, OHIO

INDUSTRIAL RUBBER PRODUCTS

Stocked on the West Coast by
HENDRIE BELTING & RUBBER CO.
405 Towne Ave., Los Angeles, Calif.
PACIFIC COAST RUBBER COMPANY
51 Main St., San Francisco, Calif.

Statement of Condition

At the Close of Business December 31, 1956

RESOURCES

Cash and Due from Banks	$100,883,206.32	
U. S. Government Securities	83,528,232.78	
Other Bonds and Warrants	13,034,638.65	$197,446,077.75
Loans and Discounts		91,229,235.18
Income Receivable Accrued		555,171.63
Stock in Federal Reserve Bank		330,000.00
Bank Premises		4,000,000.00
Customers' Liability Under Letters of Credit		289,400.48
TOTAL		$293,849,885.04

LIABILITIES

Deposits		$275,118,678.14
Letters of Credit Outstanding		289,400.48
Income Collected, Not Earned		383,117.10
Reserve for Taxes, Interest, etc.		1,231,172.58
Dividends Declared*		125,000.00
Capital — Common	$ 5,000,000.00	
Surplus	6,000,000.00	
Undivided Profits and Reserves	5,702,516.74	$ 16,702,516.74
TOTAL		$293,849,885.04

*Payable January 15, 1957

E. I. HANLON
Chairman of the Board

A. E. BRADSHAW
Vice Chr. of Board and Chief Executive Officer

W. A. BROWNLEE
President

FALKNER C. BROACH
Executive Vice-President

FRANK M. SOWLE
Senior Vice-President

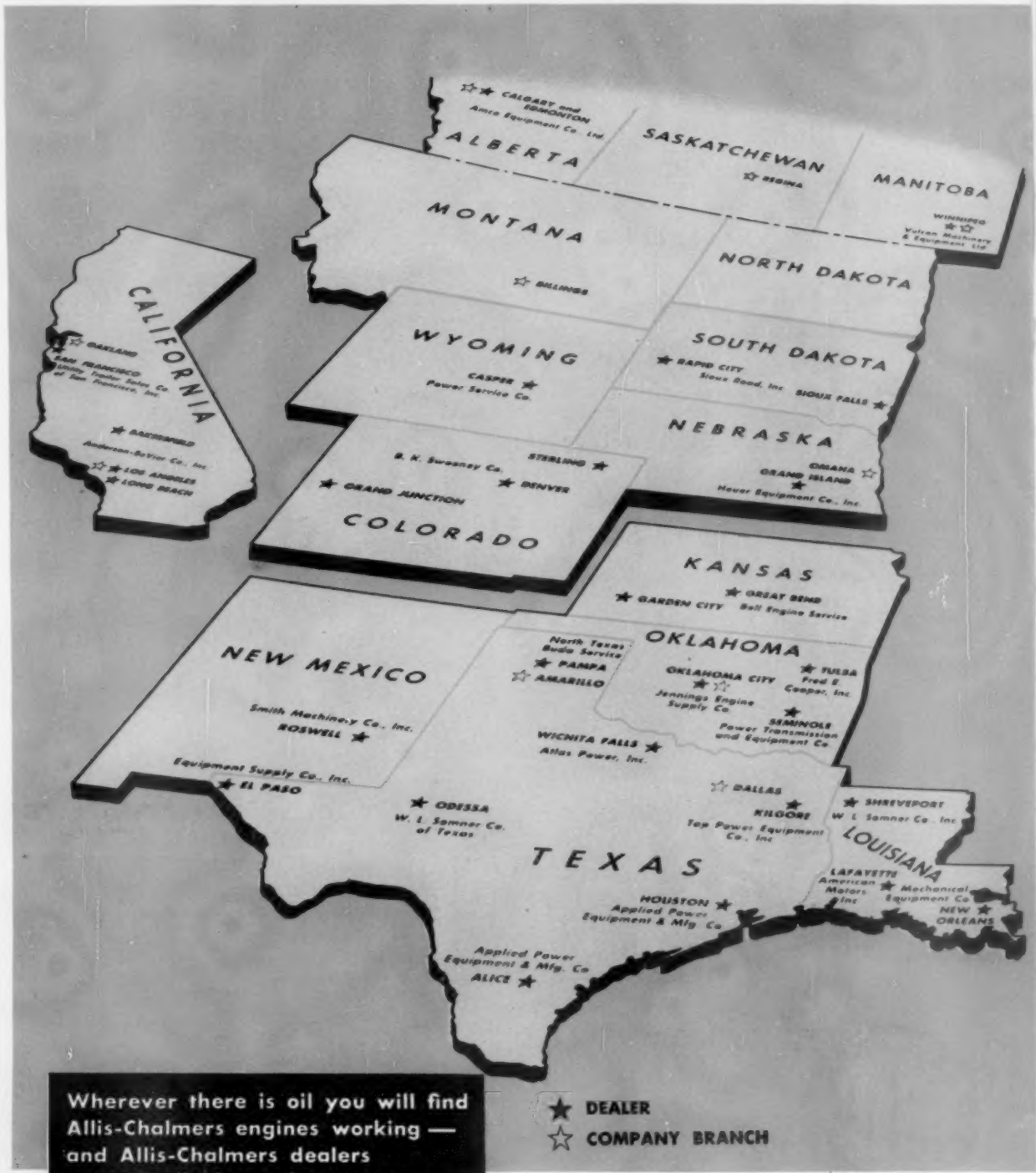
MARVIN MILLARD
Senior Vice-President

E. L. STUCKER
Senior Vice-President

NATIONAL BANK OF TULSA
THE OIL BANK OF AMERICA
MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

OKLAHOMA'S 50TH ANNIVERSARY

Look to these
Allis-Chalmers Oil Field Dealers . .

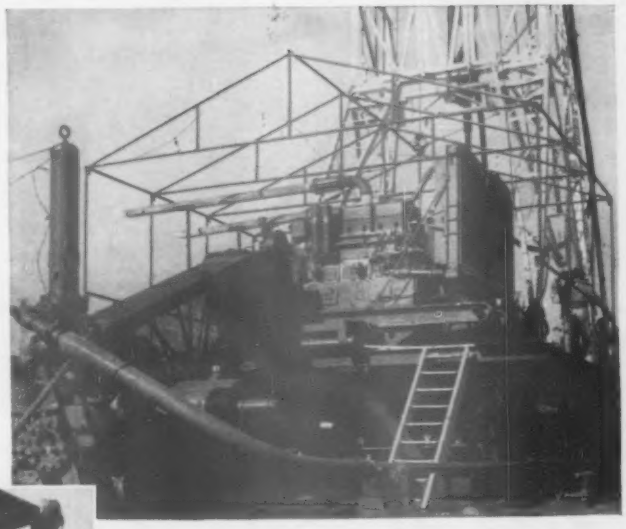


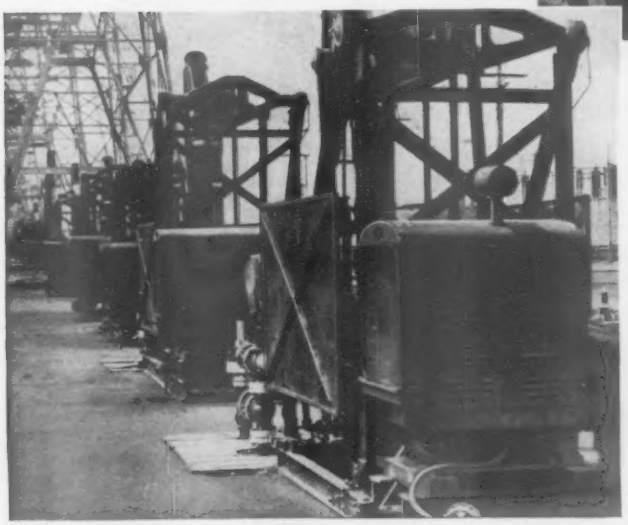
Wherever there is oil you will find Allis-Chalmers engines working — and Allis-Chalmers dealers strategically located to serve you.

. . for Engines and Service

THAT ARE TOPS!

To serve you better, Allis-Chalmers is expanding its customer service in the oil fields. This means more dealers — better equipped to serve you. It also means greater parts availability because your dealer is serviced from a nearby factory branch.





Choose from the *Complete Line* of Allis-Chalmers Oil Field Engines

Any Size
9 to 516 hp

Any Fuel
diesel, gasoline, LP and natural gas, or low-grade fuel

Any Type
open or enclosed power units, generating sets, propulsion engines

Any Use
pumping, drilling, cementing, spudder work, driving generators, etc.

ALLIS-CHALMERS, BUDA DIVISION, MILWAUKEE 1, WISCONSIN

A-C ALLIS-CHALMERS

ALLIS-CHALMERS

80-3

This is Why the Nash is the Most Simple Compressor

It's the Nash!

There are no mechanical complications in a Nash Compressor. A single moving element, a round rotor, with shrouded blades, forming a series of buckets, revolves freely in an elliptical casing containing any low viscosity liquid. This liquid, carried with the rotor, follows the elliptical contour of the casing.

The moving liquid therefore recedes from the rotor buckets at the wide part of the ellipse, permitting the buckets to fill with gas from the stationary Inlet Ports. As the casing narrows, the liquid is forced back into the rotor buckets, compressing the gas, and delivering it through the fixed Outlet Ports.

Nash Compressors produce 75 lbs pressure in a single stage, with capacities to 6 million cu. ft per day in a single structure. Since compression is secured by an entirely different principle, gas pumping problems difficult with ordinary pumps are often handled easily in a Nash.

Nash simplicity means low maintenance cost, with original pump performance constant over long periods Data on these pumps sent immediately on request

No internal wearing parts.

No valves, pistons, or vanes.

No internal lubrication.

Low maintenance cost.

Saves floor space.

Desired delivery temperature automatically maintained.

Slugs of liquid entering pump will do no harm.

75 pounds in a single stage.

NASH ENGINEERING COMPANY

313 WILSON, SO. NORWALK, CONN.

Inside Story on POWELL STEEL VALVES

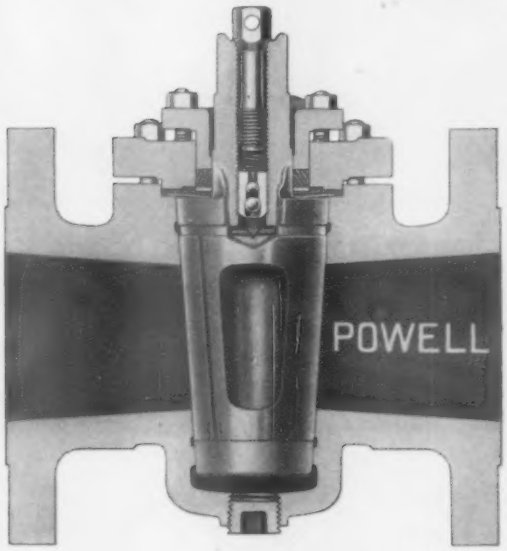


FIG. 3059—(Sectional)—A.S.A. 300-pound Steel Lubricated Plug Valve.

FIG. 2456 SS—OS&Y Gate Valve—1/16 Raised Face Separate Yoke Arms. Flanges are in accordance with ASA B16.5.

Steel Valves may appear similar on the outside. But their performance may be quite another story—for there can be a big difference in the metal, in design and in manufacture. And the inside story on Powell Steel Valves is that every valve has PERFORMANCE VERIFIED.

Only the finest materials are used in Powell Steel Valves. And painstaking quality control is rigidly enforced through each step of manufacture. For example, every machining operation is accurately gauged. All parts are thoroughly cleaned and degreased. As a final step in manufacture, EVERY POWELL STEEL VALVE IS GIVEN AN ACTUAL LINE TEST.

Because of Powell's painstaking quality control, plant shutdown through valve failure is practically unknown. Records from refineries, power and industrial plants the world over prove it.

Consult your Powell Valve distributor. If none is near you, we'll be pleased to tell you about our COMPLETE quality line which has PERFORMANCE VERIFIED.

Fig. 2433 SS—Stainless Steel Bolted Cap Swing Check Valve for 150 pounds W.P.

PERFORMANCE PV VERIFIED

The Wm. Powell Company, Cincinnati 22, Ohio . . . 111th YEAR

POWELL VALVES

BRONZE, IRON, STEEL AND CORROSION RESISTANT VALVES

Padre Island rig gets 45,214 from one Tiger Brand

Holmes Drilling Co. Rig No. 3 on Padre Island, rigged with 2500 feet of 1¼", 6 x 19, Excellay Preformed Monitor Improved Plow Steel Wire Rope with IWRC.

ton miles Wire Rope

"We always thought that 25,000 ton miles was as good service as could be expected from a drilling line, but this Tiger Brand line has lasted for 45,214 ton miles! That's the best service we ever had on any line." This statement comes from Charles N. Susil, tool pusher on Rig No. 3 of the Holmes Drilling Company, Houston, Texas.

The rig was drilling on Padre Island, about 25 miles from Corpus Christi, Texas. Four wells had been drilled with the one 2500 foot, 1¼", 6x19, IWRC wire rope. The rope had been on the rig about 15 months, making a total of 294 trips and 45,214 ton miles. That's good service any way you look at it!

The drilling on Padre Island was tough going. At times there were 290,000 pounds on the line for jarring and fishing, and much of the hole was drilled at an angle.

This job shows how accurate ton mile records give a much better picture of the real service you can expect from American Tiger Brand Wire Rope. You can get Tiger Brand Wire Rope from leading distributors anywhere in the oil fields.

One Tiger Brand Wire Rope drilled for a record-breaking 45,214 ton miles . . . almost double the expected life.

Charles N. Susil, tool pusher, says, "We got better service out of Tiger Brand than any wire rope we ever used."

Big diameter tie down and big sheaves contributed to Tiger Brand's long life.

The right Wire Rope will do the trick

AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL, GENERAL OFFICES: CLEVELAND, OHIO

COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO • UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS AMERICAN TIGER BRAND WIRE ROPE

Excellay Preformed — USS

UNITED STATES STEEL

The top men at IX who supervise your seismic surveys have a total of 152 man years of experience . . . an average of almost 20 years per person.

Experience

is the priceless ingredient that goes into every IX survey

The personnel of Independent Exploration Company has packed more than 1,559 man years of experience into the company's quarter century of service to the oil industry. That's why Independent Exploration Company can offer you the tops in fast, accurate, informative geophysical surveys. Next time call in IX for a better job.

POINTING THE WAY IXC FOR THE DRILL

Independent Exploration Company

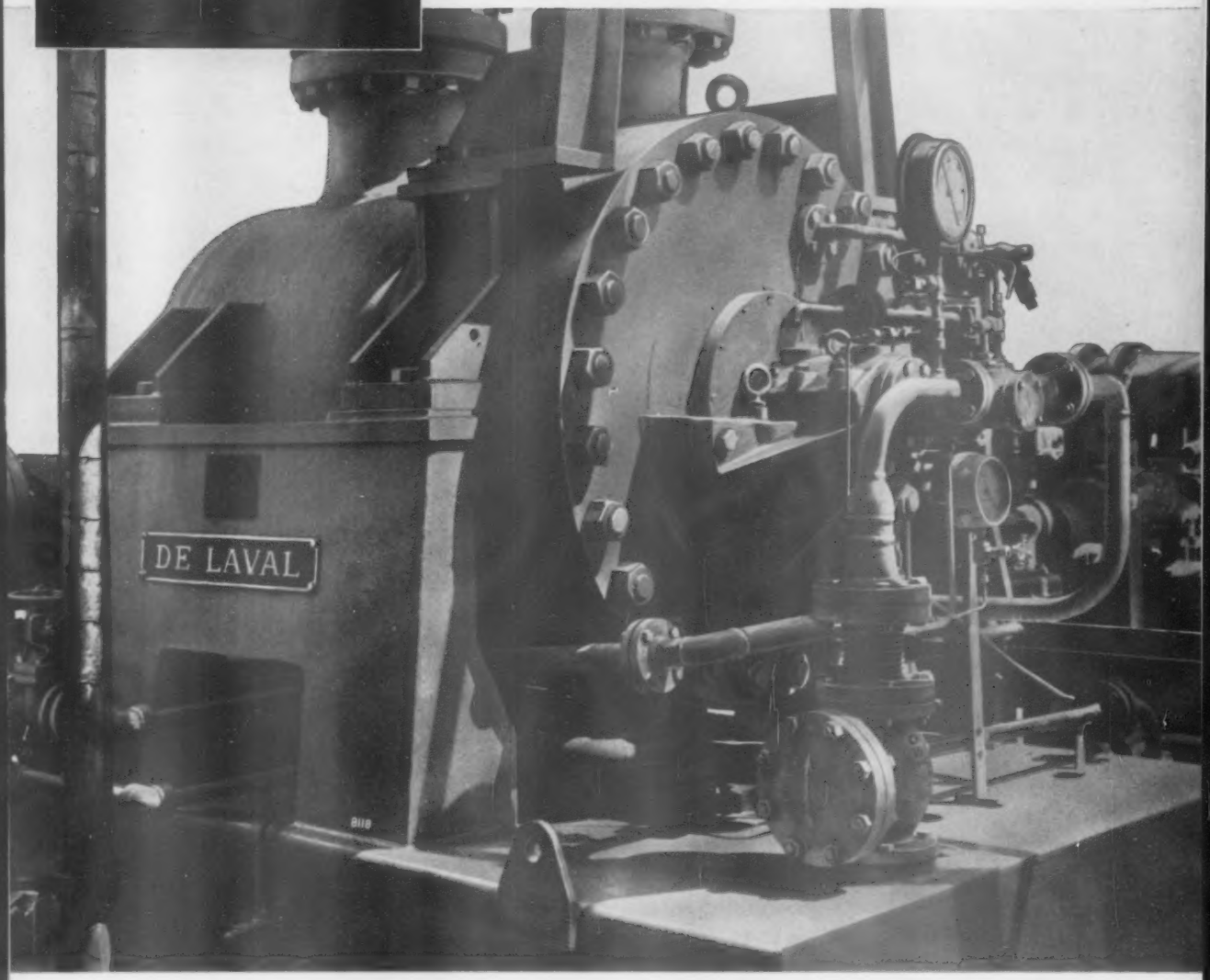
1973 West Gray, Houston, Texas
16 Coleman St., London E.C.2, England
1740 Broadway, Room B-232, Denver, Colorado

Geophysical Surveys

OVER 1,559 MAN YEARS OF EXPERIENCE

DE LAVAL
BARREL TYPE REFINERY COMPRESSOR

handles hydrogen under high pressures in a reformer at General Petroleum



Send for new Bulletin 0504

This De Laval centrifugal recycle barrel type compressor is doing a dependable job handling hydrogen under high pressures at the General Petroleum plant in Ferndale, Washington. It takes hydrogen at an inlet pressure of 500 psig and discharges it at 625 psig. The unit is driven by a 1110 hp turbine operating at 9900 rpm.

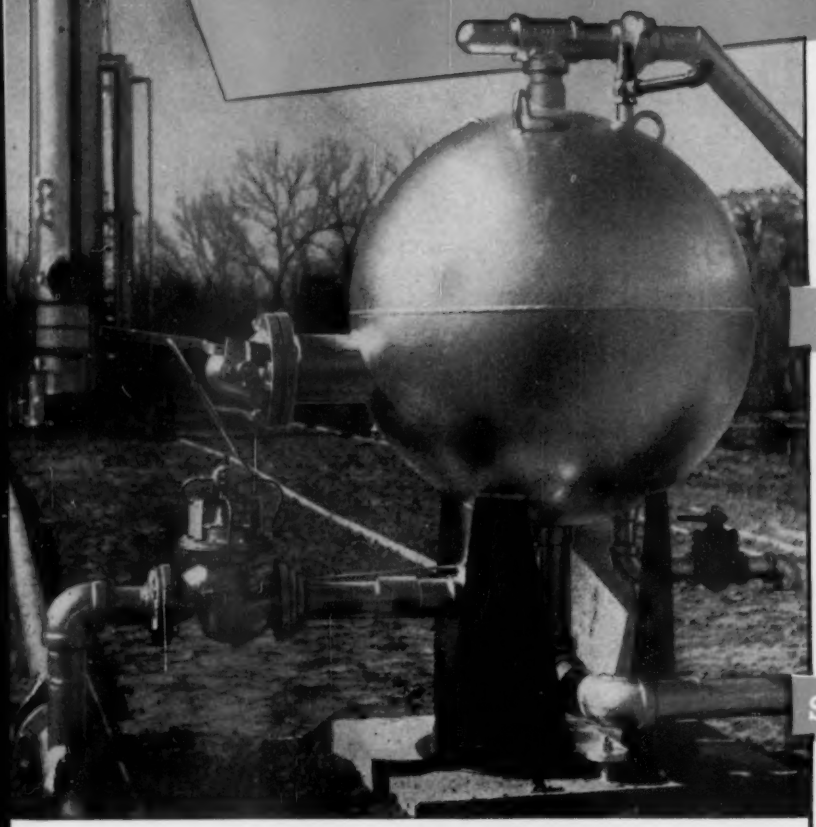
General Petroleum Corporation is only one of many refiners who have specified De Laval Compressors. Whether you need to handle light or heavy gases at high or low pressures in catalytic cracking, reforming, alkylation, coking or any similar service, it pays to look to De Laval. Rugged De Laval centrifugal compressors perform dependably in heavy-duty continuous operation. De Laval has more than 40 years of experience in solving gas compression problems.

DE LAVAL *Centrifugal Compressors*

DE LAVAL STEAM TURBINE COMPANY
810 Nottingham Way, Trenton 2, New Jersey

L-367

Gas Lift Service Causes Less "SHAKE, RATTLE AND ROLL" In a BS&B Spherical Separator!



Here's An Actual Case History From Our Files:

PROBLEM:

Freeport Oil Company needed a new production battery to handle the production from 2 wells, one of which was on gas lift, at one of their leases in Bayou Choctaw Field in Iberville Parish, La. Production from the gas lift well came in "slugs" with sufficient force to cause a serious vibration problem if put into a conventional type separator.

SOLUTION:

A BS&B Model "OGS" Spherical Separator was selected because of its ability to handle these "slugs" without undue vibration, and because of its separating efficiency. To complete the battery, the operator installed 2 BS&B 500 bbl. galvanized tanks and a BS&B Model "J" Vertical Treater, making his lease 100% BS&B equipped!

RESULT:

This production battery now handles approximately 210 bbls. of oil and 150 bbls. of salt water per day. In addition, approximately 3,300 MCF per day of gas lift gas is being run through the separator with excellent operating results.

Features Of The BS&B Spherical Separator

1. **Simple Hookup**
   Connections to top inlet and bottom outlets are easily made from any direction.
2. **Liquid Slugs**
   Internal design diverts liquid slugs rapidly to the liquid section.
3. **High Capacity**
   The large ratio of liquid surface area to volume in the liquid section allows rapid release of solution gas from the oil.
4. **Controls**
   All controls and valves are BS&B.
5. **Small Space Requirement**
   Compact design is a distinct advantage of the Model "OGS" over other separators.
6. **Servicing**
   Convenient access openings are provided to simplify periodic cleaning and blow-down.

OVER 60 YEARS — BS&B — RELIABILITY

ANOTHER EXAMPLE OF PRODUCT LEADERSHIP

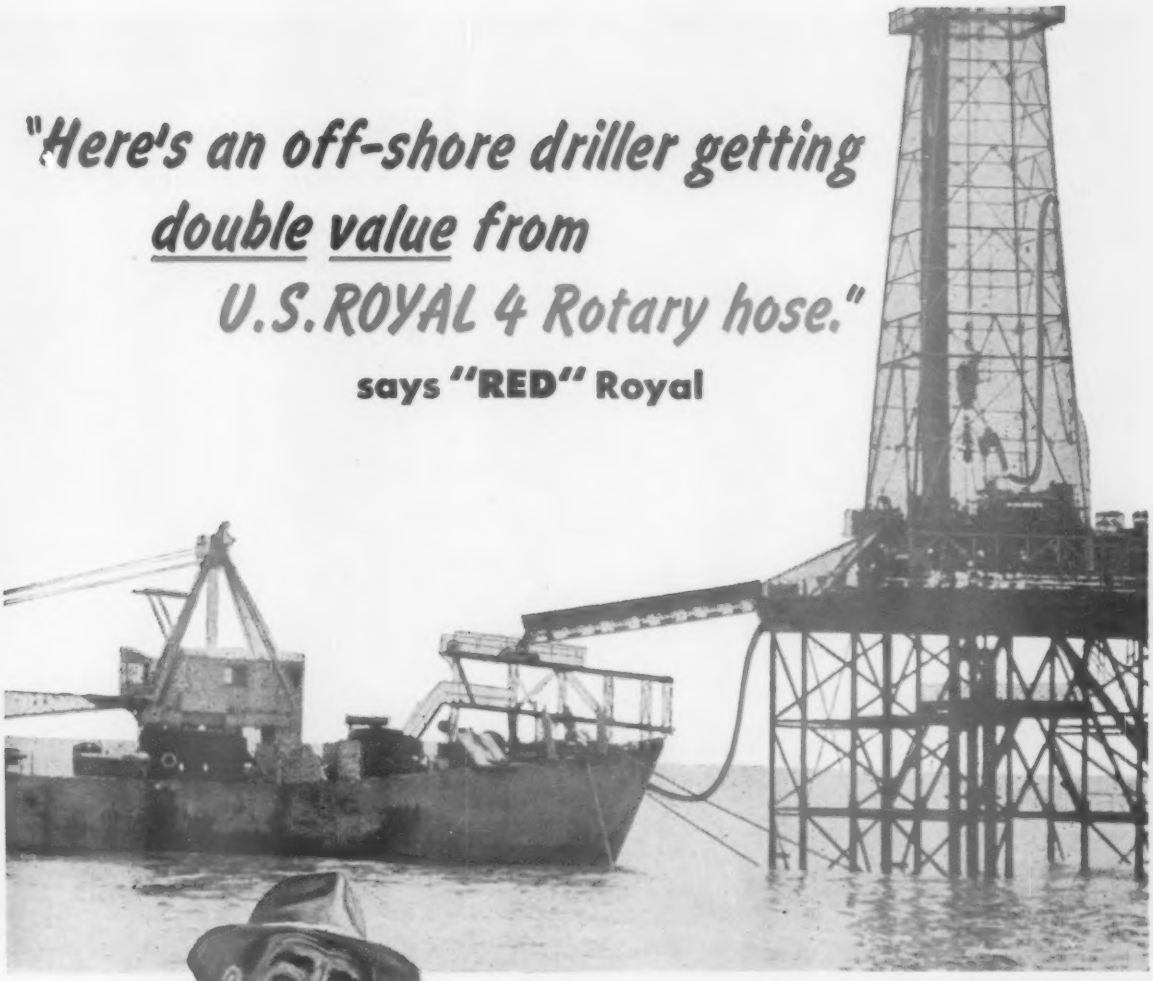
BLACK, SIVALLS & BRYSON, INC.

Oil & Gas Equipment Division, Dept. 1-A1B

1708 West Main Street — Oklahoma City, Oklahoma

"Here's an off-shore driller getting double value from U.S. ROYAL 4 Rotary hose."

says "RED" Royal



"He uses one length for drilling, another for discharge between tender and rig."

With the constant pitching and rolling of the tender, the driller wants to be sure his discharge lines flex easily even in high seas; yet they must also be strong enough to resist abrasion and pull and be able to take the high pressures encountered in off-shore work. In short, he wants the best—and that's why he's chosen Royal 4.

This tool-pusher knows—and you will, too—that Royal 4 is the most dependable, most economical hose from spud to pay. It practically eliminates expensive downtime for lubrication or repair. The Royal 4 on this rig, for instance, has been in constant use for over 2½ years . . . and it's still in good shape!

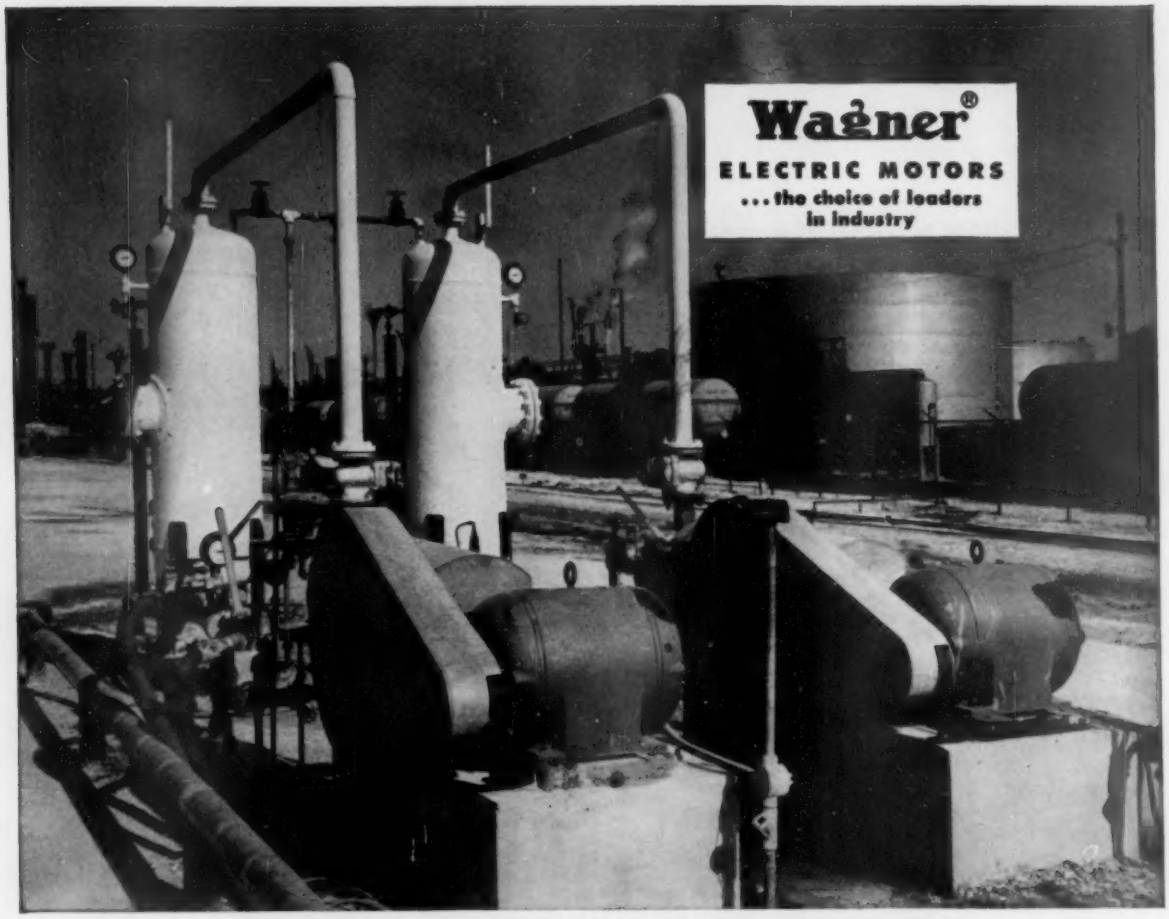
Ask your local "U. S." Supply Store for Royal 4—and for its quality mud pump companions, U. S. Vibrator hose and U. S. Giant® Mud Pump Suction hose.

Available in all FIELDS at SUPPLY STORES

US RUBBER

Mechanical Goods Division

United States Rubber



Protected against explosion

WAGNER JP MOTORS

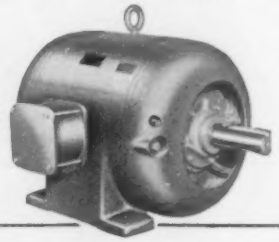
A single spark in a hazardous atmosphere can mean the end of refinery production ... to say nothing of possible loss of life and millions of dollars in damage from fire and explosion.

Wagner Type JP Explosion-Proof Motors are expressly built for applications in hazardous atmospheres. They're perfect for the job ... that's why they're the time-tested favorites of the petroleum industry—in pumping stations and in refineries. They are approved by Underwriters' Laboratories for Class 1 Group D hazardous locations. These motors are available in a complete range of ratings through 250 hp, normal torque and high torque.

In addition to these explosion-proof motors, Wagner also maufactures a line of drip-proof 40°C. polyphase motors, in ratings through 75 hp, especially designed for the continuous outdoor service demanded by oil well pumping applications. High power factor type capacitor oil well pumping motors are available for use where single-phase motors are required.

Write for Bulletin MU-132 on Cast Iron Frame Motors and for Bulletin MU-137 on Oil Well Pumping Motors. Thirty-two branch offices are ready to assist you in any motor application problem.

This Wagner Type JP Explosion-Proof, cast iron motor, with frames and end-plates of cast iron, is suitable for indoor or outdoor use and for installations where corrosion is a problem ... as well as for general applications.

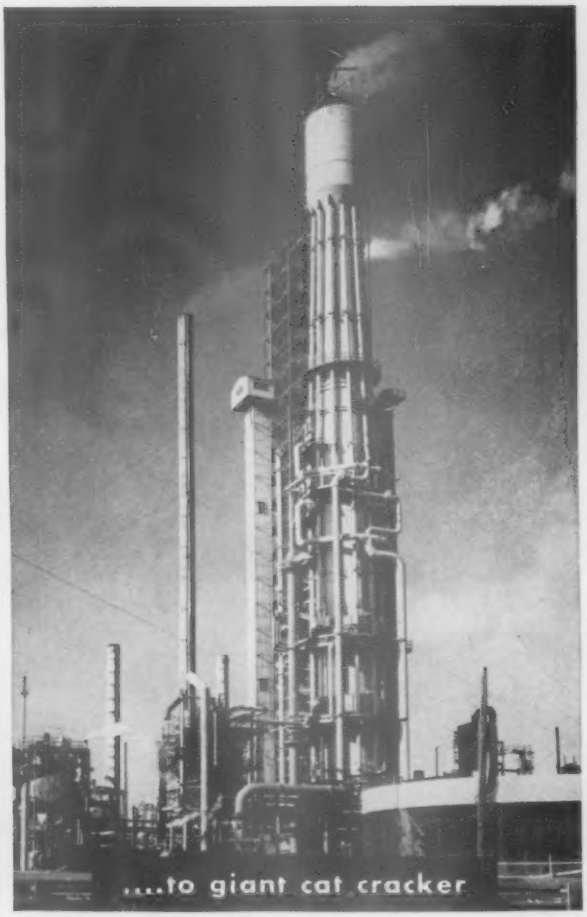


Wagner Electric Corporation
6389 Plymouth Ave., St. Louis 14, Mo., U.S.A.

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

M56-3

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES • AUTOMOTIVE BRAKE SYSTEMS–AIR AND HYDRAULIC



Limitorque® Valve Controls Maintain Constant Catalyst Flow in Sun Oil's New Houdriflow Unit at Marcus Hook

To process more than 50,000 gallons of hot oil, 700 tons of cracking catalyst is delivered per hour to the top of this 350 ft. reactor. Limitorque valve operators open and close specially designed mixer valves, maintaining uniform flow of the air-blown catalyst through 12 pneumatic lift pipes. The Limitorque units are actuated by remote, push-button controls at a central control room panel.

Accurate regulation of catalyst flow is vital to the catalytic cracking process. Limitorque valve controllers are handling the job efficiently and effortlessly.

Limitorque motor-operated valve controllers may be actuated either remotely or manually, to open and close all types of valves. They are readily adapted to microwave control. Wherever valve operation is important . . . look to Limitorque.

Send for illustrated 30-page catalog, L-550, describing Limitorque automatic valve controllers and components.

LimiTorque®

PHILADELPHIA GEAR WORKS, INC.
ERIE AVE. & G STREET, PHILADELPHIA 34, PENNA.
Offices in all Principal Cities

INDUSTRIAL GEARS & SPEED REDUCERS • LIMITORQUE VALVE CONTROLS • FLUID MIXERS • FLEXIBLE COUPLINGS

Limitorque Corporation • Philadelphia

ISO-

ISOMERIZATION

- Isomerizes Pentane and Hexane Fractions
- New, Precious Metal Catalyst (non-platinum)
- Isomer Yields of 97% and Higher
- Flexibility of Feedstocks
- No Corrosive Elements in System
- Only One Reactor Needed
- Minimum Makeup Hydrogen Required

ISOMERIZATION OF PENTANE-HEXANE FRACTION FROM COMMERCIAL STOCKS

	KUWAIT		MID-CONTINENT		NAT. GASOLINE	
	Feed	Product	Feed	Product	Feed	Product
TOTAL C_5-C_6						
Vol. %	100.0	97.3	100.0	96.7	100.0	99.2
Octane CFRR-Clear	63.7	77.7	62.1	77.0	72.3	83.3
+3 cc TEL	88.3	96.2	87.3	95.8	93.9	99.8
PENTANE FRACTION						
Vol. %	45.0	45.0	34.5	34.5	58.5	58.5
Octane CFRR-Clear	74.4	91.0	72.9	91.0	79.2	91.0
+3 cc TEL	95.8	104.9	94.9	104.9	98.4	104.9
HEXANE FRACTION						
Vol. %	55.0	52.3	65.5	62.2	41.5	40.7
Octane CFRR-Clear	54.9	66.3	56.4	69.2	62.6	72.2
+3 cc TEL	82.2	88.7	83.3	90.7	87.5	92.4

ISO-KEL

by M.W. KELLOGG

ISO-KEL is a new process developed by The M. W. Kellogg Company for isomerizing light naphthas. Designed to help refiners increase their high octane pool, ISO-KEL can upgrade combined streams of pentane and hexane fractions as well as natural gasoline.

One desirable application of ISO-KEL produces two separate products: (1) an isopentane stream of 104.9 CFRR+3 cc TEL, and (2) an isohexane stream of 89 to 92 CFRR+3 cc TEL, depending on the feedstock. When charging light naphtha, the combined streams have an over-all yield of 97 vol. % and an octane number of about 96 CFRR+3 cc TEL. When feeding natural gasoline, over-all yield is 99 vol. % and octane number about 99.8 CFRR+3 cc TEL.

The advantages of this new ISO-KEL process rest on a new, precious metal catalyst (not platinum) developed by M. W. Kellogg's research laboratories. This vapor-phase process requires only one reactor—which operates in the presence of hydrogen. Operating conditions are less severe than those for reforming heavy naphtha.

Economic soundness of the ISO-KEL process is illustrated in the case of a 50,000 BPD refinery, where a 3,100 BPD ISO-KEL unit would have a payout of about 19 months. Write for further economic and technical data.

Refinery Process Division
THE M. W. KELLOGG COMPANY
711 Third Avenue, New York 17, N. Y.
A SUBSIDIARY OF PULLMAN INCORPORATED

The Canadian Kellogg Company Limited, Toronto
Kellogg International Corporation, London
Societe Kellogg, Paris
Kellogg Pan American Corporation, New York
Companhia Kellogg Brasileira, Rio de Janeiro
Compania Kellogg de Venezuela, Caracas

Refinery Process Division
THE M. W. KELLOGG COMPANY
711 Third Avenue, New York 17, N. Y.
Send further information on ISO-KEL *Isomerization*

Name _____

_____ (Position)

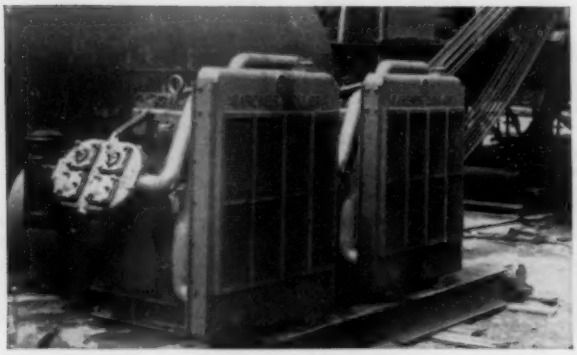
Company _____

Address _____

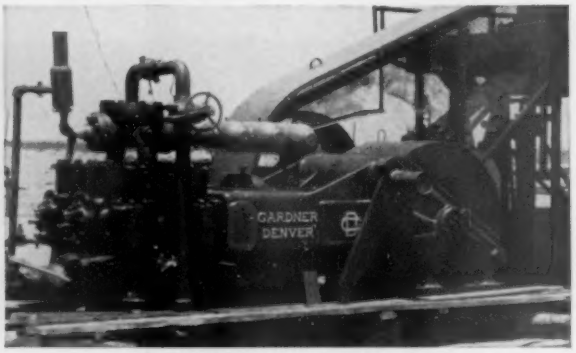
_____

O&GJ—1-28-57

Gardner-Denver . . . Serving the World's Basic Industries

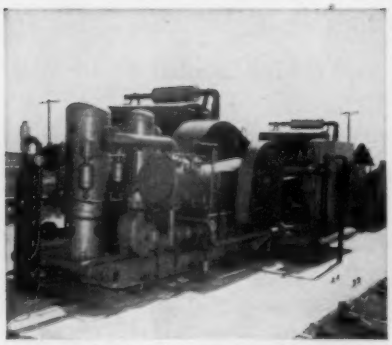


Compressors for air drilling



Mud pumps for deep holes

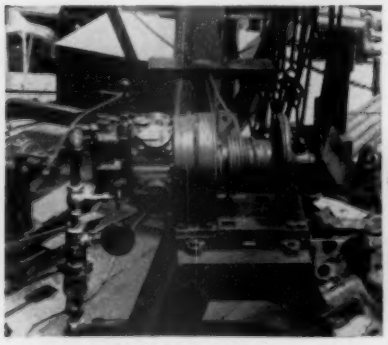
In step with oil industry progress
Gardner-Denver quality equipment



Gas booster compressors

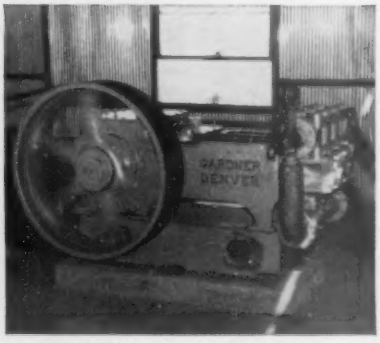
Well servicing pumps

Air for pipe line testing



Air hoists for the rig

"Quad-dril"® for pipeline rock work



Full line of water flood pumps

In drilling . . . producing . . . pipelines . . . Gardner-Denver equipment leads the way! Send for details.

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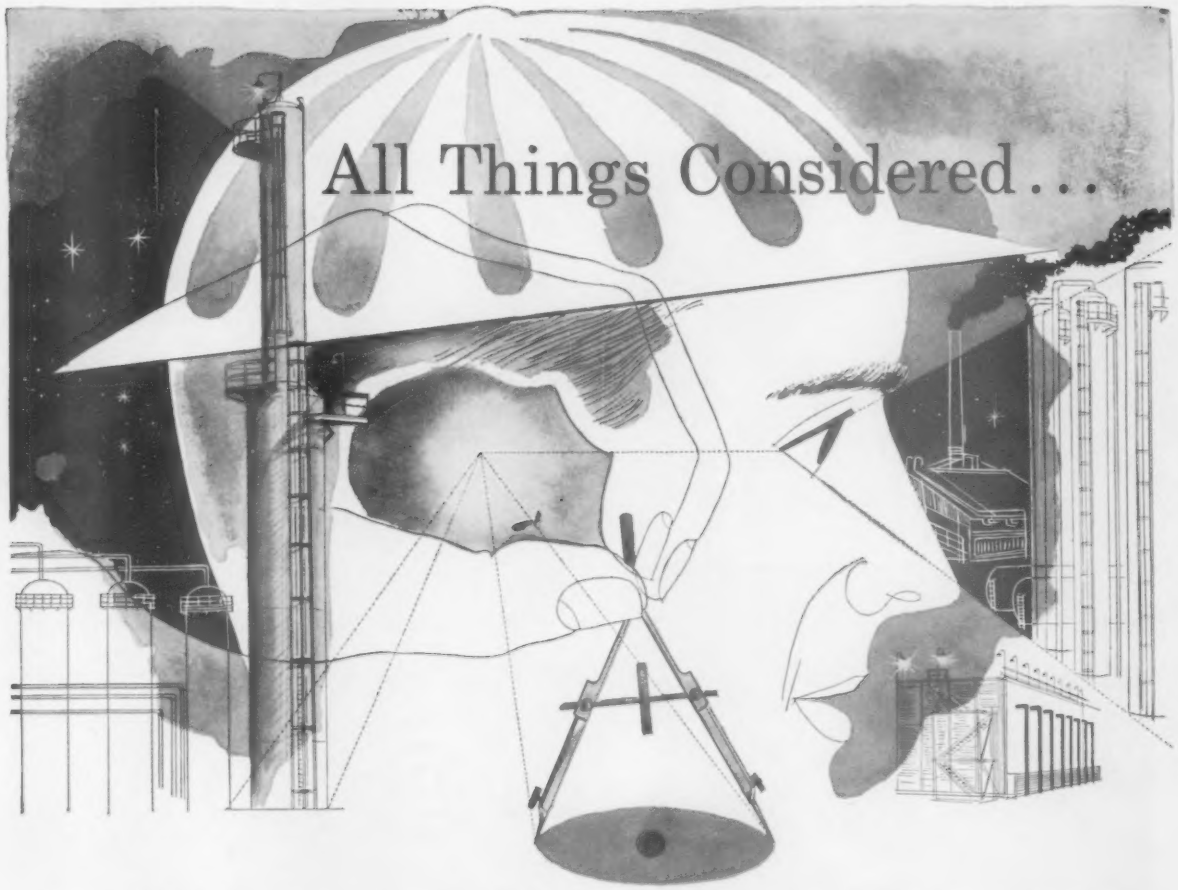
Dallas, Houston, Tulsa, St. Louis, Los Angeles, New York, Pittsburgh, Denver, New Orleans, San Francisco, Kansas City



PRITCHARD'S SINGLE RESPONSIBILITY CONTRACT HAS MORE TO OFFER YOU!

CONSIDER THE TIME . . . When building a new plant, modernizing or expanding present facilities, time is money. Every extra day of construction means greater cost to your company.

CONSIDER PRITCHARD . . . Pritchard's Single Responsibility Contract saves valuable time by coordinating the project from engineering through final testing. Work begins on your plant before engineering drawings are completed. Pritchard teams work closely together, assuring a continuous, rapid flow of activity.

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CONSIDER PRITCHARD . . . Pritchard aids in this area, too. First, the plant goes into production quicker, thereby producing income sooner and you save interest on your invested money. Second, Pritchard's diversified purchasing experience saves you time, trouble and cold cash by coordinating all purchasing of equipment, materials and labor.

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YOUR SPECIFIC INQUIRY IS INVITED.

SERVING THE GAS, PETROLEUM, CHEMICAL, PETROCHEMICAL, PULP, AND PAPER INDUSTRIES AND THE POWER PLANT NEEDS OF INDUSTRY AND CORPORATE UTILITIES.

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CONNECT LEAD WIRE TO HEADER CABLE
#6 TYPE RR SINGLE CONDUCTOR STRANDED COPPER CABLE
1'± 1'± 4' TO 5' 1'± 1'±
GROUND BED CABLE #6 TYPE RR WIRE CADWELD CONNECTION #32 CARTRIDGE
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TAPE CONNECTION PER WRITTEN SPECS
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IT IS IMPORTANT THAT ALL SPLICES BE ABSOLUTELY WATERPROOF
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PROPOSED CATHODIC PROTECTION SYSTEM FOR CITY OF LEXINGTON MUNICIPAL HOUSING COMMISSION HOUSING PROJECT KY-4-1
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CADWELD® electrical connections specified for cathodic protection system

HARCO CORPORATION, Cleveland, Ohio Cathodic Protection Engineering Firm specifies CADWELD Electrical Connections on cable-to-cable and cable-to-pipe connections.

A recent installation involved CATHODIC PROTECTION of four complete Housing Projects at the City of Lexington Municipal Housing Development.

Harco uses CADWELD connections because they insure constant low resistance for the life of the Cathodic Protection system. CADWELD connections require minimum time for application and result in lower installation cost.

Write for FREE Bulletin 656-10. Your local CADWELD Cathodic Protection Dealer's name on request.

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They Say—

Kansas' Severance Tax . . .

Oil Tax Favoritism Claimed

"Both farm and labor groups have insisted that it is time for the legislators to give honest, objective consideration to a severance tax on oil and gas production. The past record on the issue, which is not one of the bright spots of Kansas legislation, should be forgotten. Oil men will contend, as usual, that severance proponents merely are trying to load the taxes on someone else.

"There is a far stronger reason to favor the severance tax . . . Kansas producers in the flush areas are not paying state taxes in proportion to those paid by oil producers in other states. For years they have enjoyed a jealously guarded and politically protected tax favoritism.

"Every honest study bears out this favoritism, despite the fact that Kansas counties do levy a property tax on oil wells based on production . . . Certainly there should be consideration for the marginal stripper producers. Any fair tax would provide exemptions on marginal production and secondary-recovery operations to avoid economic loss.

"Legislators will have to be on guard against any effort by the oil industry to offer a severance tax 'in lieu of other taxes.' This would simply be a move to defeat the bill."

Editorial in Kansas City Star.

New Tax Would Be Harmful

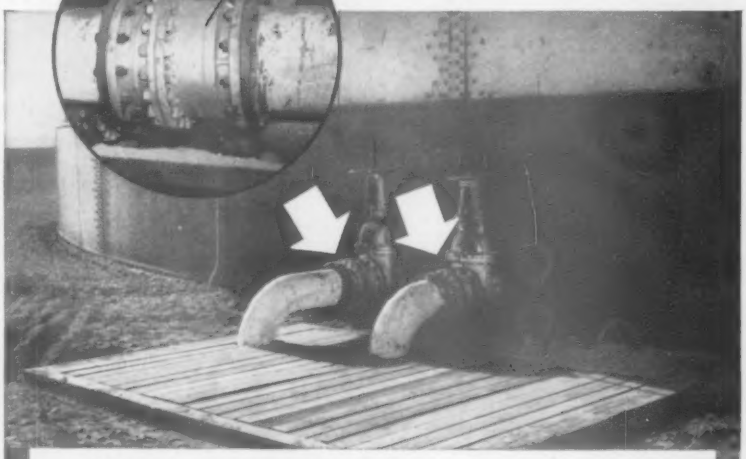
"The oil men of Kansas are girding themselves for a last ditch fight against the adoption of a severance tax on gas and oil in Kansas. Such measures have been introduced at every session of the legislature for the past 30 years or more and it will happen again.

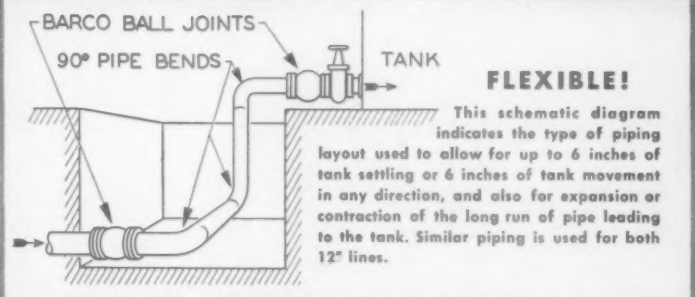
"The severance tax proposal has many advocates but strangely enough most of them live in the areas of Kansas where there is no oil or gas production. Our taxing provisions in the Kansas constitution and statutes guarantee that taxation shall be fair and equal. These provisions do not contemplate that whenever the state or any other political subdivision needs funds that a single industry or class shall be picked out as the victims to furnish them.

"Secondly, the proponents of a severance tax, either purposely or not, distort the facts by attempting to argue

NEW

12" BARCO
Flexible Ball Joints
(also new 8" and 10" sizes)





FLEXIBLE!

This schematic diagram indicates the type of piping layout used to allow for up to 6 inches of tank settling or 6 inches of tank movement in any direction, and also for expansion or contraction of the long run of pipe leading to the tank. Similar piping is used for both 12" lines.

Built to Handle Big Tank Jobs!

One of the first places where twelve of Barco's new large size Flexible Ball Joints have been put to use is on three 170,000 bbl. West Coast tanks which receive crude from a new 12,000 ft. long 24" off-shore pipeline. As shown in the above photograph, each tank is connected by two 12" lines—each fitted with two 12" Barco Ball Joints. The joints provide the following advantages:

1. **Allow for tank settling or tilting. Also pipe expansion.**
2. **Isolate tanks against earthquake shock; also pump shock.**
3. **Maximum protection against Fire Hazards.**

For detailed information about new 8", 10" and 12" Barco Ball Joints, see our nearest representative or WRITE FOR NEW CATALOG 215B. Joints available in Bar-Ductile metal or steel; flanged or welding ends. 15° angular flex.

FOUNDED 1908 BARCO PRODUCTS BACKED BY EXPERIENCE

BARCO MANUFACTURING CO.
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The Only Truly Complete Line of Flexible Ball, Swivel, Swing and Revolving Joints
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"Take a right at the Tysco Separators!"

LANDMARKS of the OIL FIELDS

Every rutted road in the oil fields seems to pass beside a TYSCO installation sooner or later — perhaps it will be a vertical, horizontal, or spherical separator, a series of steel tanks, an emulsion treater, volume or indirect heater, water knockout unit, or some other type of production equipment displaying the oval TYSCO emblem.

It's true that these TYSON SMITH CO. products are often landmarks of the oil field, but they're also hallmarks . . . of engineering quality, reliability, and design efficiency.

Wherever that TYSCO emblem appears, on a steel vessel or on a service engineer's car, it stands for quality. Remember it when your next producer is flowing, and specify TYSCO!

TYSCO

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. . . one of the Smith industries

that the State of Kansas is losing revenue by not having the tax whereas there are some other states that do have it. The Kansas oil production is subjected to an ad valorem tax that amounts to approximately 80 or 85 per cent of its actual valuation. Other real property in Kansas is assessed for taxation purpose at about 20 or 21 per cent on a state-wide average basis.

"Even the most fundamental arithmetic projection shows that the oil and gas production in Kansas is now being taxed approximately four times heavier than the other real property in the state.

"Some states use either an ad valorem or a severance tax and Kansas oil production would pay less money on a severance tax than they are now paying, but under a severance tax the money would go to the state rather than to the counties where it now goes. . . Any way you look at it, a severance tax on oil and gas in Kansas would be exceedingly harmful."

Editorial in the Great Bend, Kans., Tribune.

Venezuelan Oil, Past and Future

"According to our estimates, Venezuelan oil production last year averaged approximately 2,456,000 bbl. daily which compared with the average 1955 production of 2,157,900 bbl. daily, an increase of 13.8 per cent.

H. W. HAIGHT

"The average increase in production by industry during the period 1946-56 was 8.6 per cent. It may be seen, therefore, that the percentage of increase in 1956 exceeded substantially the percentage of average increase during the past 10 years.

". . . We must recognize that the normal market for Western Hemisphere oil is in the Western Hemisphere for two reasons: First, the majority of European countries do not have sufficient foreign exchange to pay for Western Hemisphere oil, and secondly, Western Hemisphere oil meets difficulties in competing in Europe with Middle East oil, under normal conditions.

"We continue optimistic with respect to future demands for Venezuelan oil in the Western Hemisphere, recognizing, of course, that there will be a cycle in future demand. In other words, there will be years of strong demand and years of less demand according to general economic conditions. But over the long run, demand will continue to increase."

H. W. Haight, president, Creole Petroleum Corp.

CALENDAR

JANUARY

31-Feb. 1 Annual instrument short course of Southern California Meter Association. Los Angeles Harbor Junior College, Wilmington, Calif.

FEBRUARY

4-8 American Society for Testing Materials, annual committee week and spring meeting, Benjamin Franklin Hotel, Philadelphia.

6 Petroleum Equipment Suppliers Association, Pacific district spring meeting, Ambassador Hotel, Los Angeles.

7-8 Western Petroleum Refiners Association, Gulf Coast regional technical-industrial relations meeting, Lamar Hotel, Houston.

8-9 American Society for Testing Materials, Symposium on composition of petroleum, Jung Hotel, New Orleans.

13-15 National Association of Corrosion Engineers, Tulsa section, eighth annual short course for pipeliners, Hotel Mayo, Tulsa.

15-16 National Society of Professional Engineers, spring meeting, Hotel Francis Marion, Charleston, S. C.

17-18 Engineers Joint Council, Statler Hotel, New York.

21-22 Chemical Institute of Canada, eleventh division conference, protective coatings division, Seaway Hotel, Toronto, February 21, and Ritz Carlton Hotel, Montreal, February 22.

22 Natural Gasoline Association of America, Permian basin regional meeting, Scharbauer Hotel, Midland, Tex.

24-28 American Institute of Mining, Metallurgical and Petroleum Engineers, annual meeting, Hotels Roosevelt and Jung, New Orleans.

25-27 American Association of Petroleum Geologists, Rocky Mountain section, Rainbow Randevu, Salt Lake City.

27-28 Gas Conditioning Institute, sponsored by the University of Kansas extension, Southwest Kansas Center, Randall's, Liberal, Kans.

MARCH

3-6 American Institute of Chemical Engineers, regional meeting, the Greenbrier, White Sulphur Springs, W. Va.

6-8 American Petroleum Institute, southwestern district production division meeting, Statler-Hilton Hotel, Dallas.

8 Ohio Oil and Gas Association, winter meeting, Deshler-Hilton Hotel, Columbus, Ohio.

11-15 American Institute of Chemical Engineers, regional meeting, Philadelphia.

11-15 National Association of Corrosion Engineers, Kiel Auditorium, St. Louis.

11-21 Quality Control by Statistical Methods, tenth annual short course, sponsored by University of Illinois, College of Engineering and Division of Engineering Extension, Champaign, Ill.

12-13 Subsurface Geology Symposium, fifth annual conference, sponsored by the University of Oklahoma, Norman, Okla.

13-15 Society of Exploration Geophysicists, tenth annual mid-western meeting, Hotel Texas, Fort Worth.

20-22 American Petroleum Institute, southern district production division meeting, Washington-Youree and Captain Shreve Hotels, Shreveport, La.

25-27 Western Petroleum Refiners Association, annual meeting, Hilton Plaza Hotel, San Antonio, Tex.

25-29 American Society for Metals, Western

With expanded storage capacity . . . INCREASED FIRE HAZARD?

Although greater storage capacity can spell big advantages in marketing, it is certain to bring an increase in fire hazard . . . particularly where flammable liquids are stored. Be sure your fire protection program grows with your capacity. Ask National Foam for expert recommendations.

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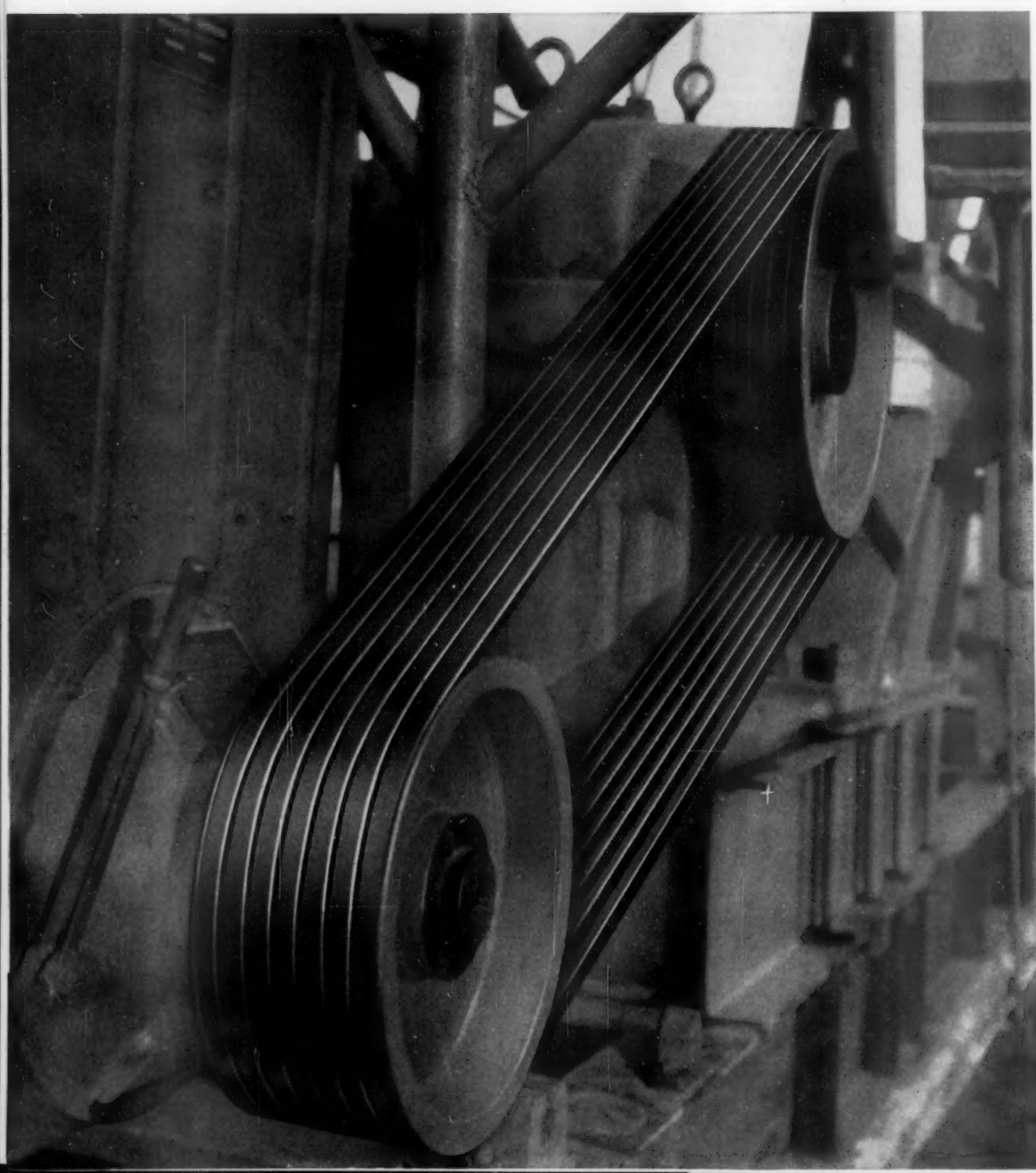
WHY SETS OF DAYTON THOROBRED CUT DOWNTIME



V-BELTS LAST LONGER,

ON PUMPING UNITS

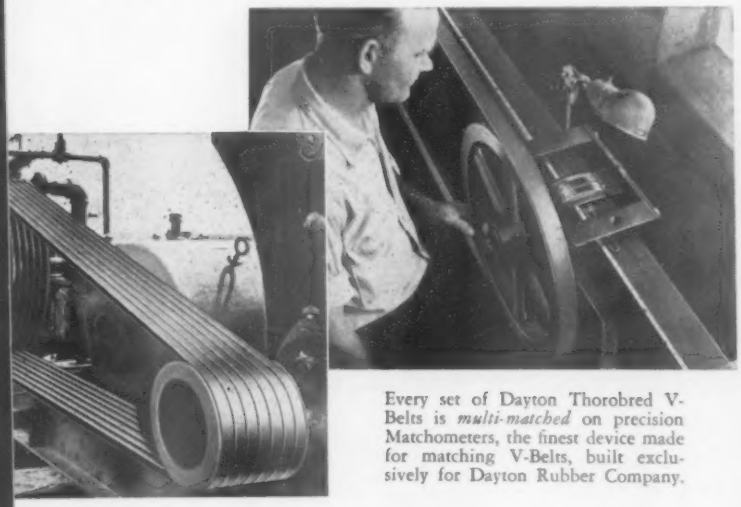
Accurate multi-matching on precision Matchometers assures full life of every set

Behind the long, dependable, month-after-month service you get from every set of Dayton V-Belts is the Dayton practice of *multi-matching*.

To begin with, Dayton Thorobreds are built for uniformity, then so accurately matched that every V-Belt pulls its full share of the load. This precision matching is made possible by Dayton's exclusive Matchometers. Performing the original matching in the Factory, Matchometers are again used in Regional and District Warehouses to check and recheck every set—that's *multi-matching*—precision matching, checked and rechecked.

Because Dayton V-Belts are matched so carefully, they all pull together, so every V-Belt is better able to stand up under the heavy vibration of a deep well unit.

To lower the actual cost of your V-Belts through longer wear and to eliminate costly downtime put *multi-matched* sets of Dayton Thorobreds on your pumping equipment. They're available right now at all the supply points shown at right.



Every set of Dayton Thorobred V-Belts is *multi-matched* on precision Matchometers, the finest device made for matching V-Belts, built exclusively for Dayton Rubber Company.

Dayton Rubber

World's Largest Manufacturer of V-Belts

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San Francisco—401 Howard St.

Louisiana
New Orleans—632 S. Peters St.
Shreveport—214 N. Market St.

Texas
Abilene—628-30 Walnut St.
Corpus Christi—1920 N. Port Ave.
El Paso—1701 Texas St.
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Colorado
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Lake Charles—
Behring's Bearing Service of La., Inc.
New Orleans—
New Orleans Belting and Bearing Co.
Oil City—Oil City Hardware Co.
Shreveport—Bearing Transmission Co.

Nebraska
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Oklahoma City—Green Head Service Co.

Texas
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Brownsville—Alamo Iron Works
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Corpus Christi—Alamo Iron Works
Bradley's Motor & Armature Works
Houston-Oil Field Material Co.
Stewart Dean Co.
El Paso—El Paso Saw & Belting Co.
Freer—Houston-Oil Field Material Co.
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Houston-Oil Field Material Co.
Kilgore—Jack Anderson Engine Co.
Lubbock—Lubbock Electric Co.
Bearing Specialists Co.
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Here is a new full-revolving, stationary-mounted crane — the UNIT Mariner — specially designed for off-shore drilling operations. Conceived, developed and perfected by UNIT, the Mariner meets all requirements for cargo handling from a fixed mounting as applied to ships, barges or off-shore platforms. Unlike conventional cranes, the Mariner emphasizes unusual strength in turntable, roller path, rollers, hook shoes, boom and hoist mechanism.

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SAFETY is a major feature. Incorporated in the Mariner design, are positive and mechanical boom stops. These boom stops control the angle of elevation and prevent the boom from whipping back. Also the safety-promoting Full Vision Cab enables the operator to see what he is doing at all times. Load ratings are based on high factors of safety.

Yes, the Mariner is designed primarily for your type of cargo handling. Get the facts. Send for bulletin — NOW.

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Metal Exposition and Congress, Ambassador Hotel and Pan-Pacific Auditorium, Los Angeles.

27-29 American Power Conference, Sherman Hotel, Chicago.

APRIL

1-4 American Association of Petroleum Geologists, national convention, Kiel Auditorium, St. Louis.

2-4 Corrosion Control, fourth annual conference, sponsored by National Association of Corrosion Engineers and the University of Oklahoma College of Engineering, University of Oklahoma, Norman, Okla.

7-10 Petroleum Equipment Suppliers Association, annual convention, Palm Springs, Calif.

7-12 American Chemical Society, national meeting, Miami, Fla.

8-10 American Society of Mechanical Engineers, spring meeting, Dinkler-Tutwiler Hotel, Birmingham, Ala.

9-11 American Welding Society, fifth annual welding show, Convention Hall, Philadelphia.

10-12 American Petroleum Institute, Mid-Continent district production division meeting, Mayo Hotel, Tulsa.

11-13 Institute of Radio Engineers, ninth annual southwestern I.R.E. conference and electronics show, sponsored by Houston section, Shamrock Hilton, Houston.

11-13 Institute of Radio Engineers, second national simulation conference, sponsored by Professional Group on Electronic Computers, Shamrock Hilton Hotel, Houston.

11-13 American Institute of Mining, Metallurgical, and Petroleum Engineers, Pacific Northwest Regional Conference, Portland, Ore.

16-18 Petroleum Industry Electrical Association annual meeting, Shamrock Hilton Hotel, Houston.

16-18 Petroleum Electric Suppliers Association, Shamrock Hilton Hotel, Houston.

16-18 Southwestern Gas Measurement Short Course, University of Oklahoma, Norman, Okla.

16-18 National Petroleum Association, fifty-fourth semiannual meeting, Cleveland.

18-19 Texas Petroleum Research Committee and Permian Basin Section of American Institute of Mining, Metallurgical, and Petroleum Engineers, tenth annual oil-recovery conference, Midland, Tex.

24-26 National Gasoline Association of America, thirty-sixth annual convention, Rice Hotel, Houston.

24-26 American Petroleum Institute, Rocky Mountain district production division meeting, Gladstone, Townsend, and Henning Hotels, Casper, Wyo.

25-27 American Association of Petroleum Landmen, third annual convention, Hilton Hotel, San Antonio, Tex.

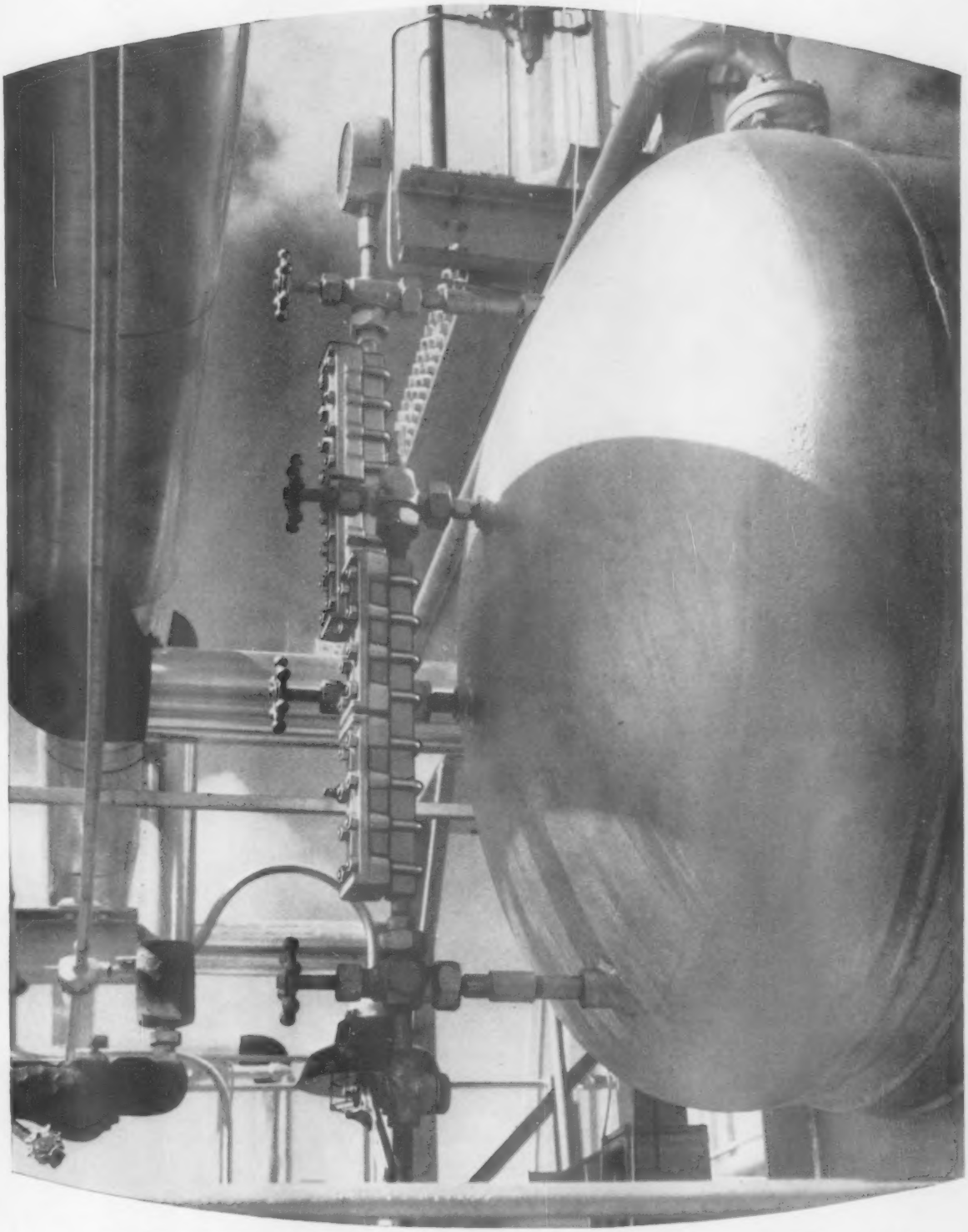
28-30 Independent Petroleum Association of America, midyear meeting, Buena Vista Hotel, Biloxi, Miss.

29-30 Automatic Control in the Petroleum and Chemical Industries, conference sponsored by the University of Oklahoma, extension study center, University of Oklahoma, Norman, Okla.

29-May 1 Southern Gas Association, annual convention, New Orleans.

MAY

6-8 American Petroleum Institute, annual pipeline conference, Cleveland Hotel, Cleveland.



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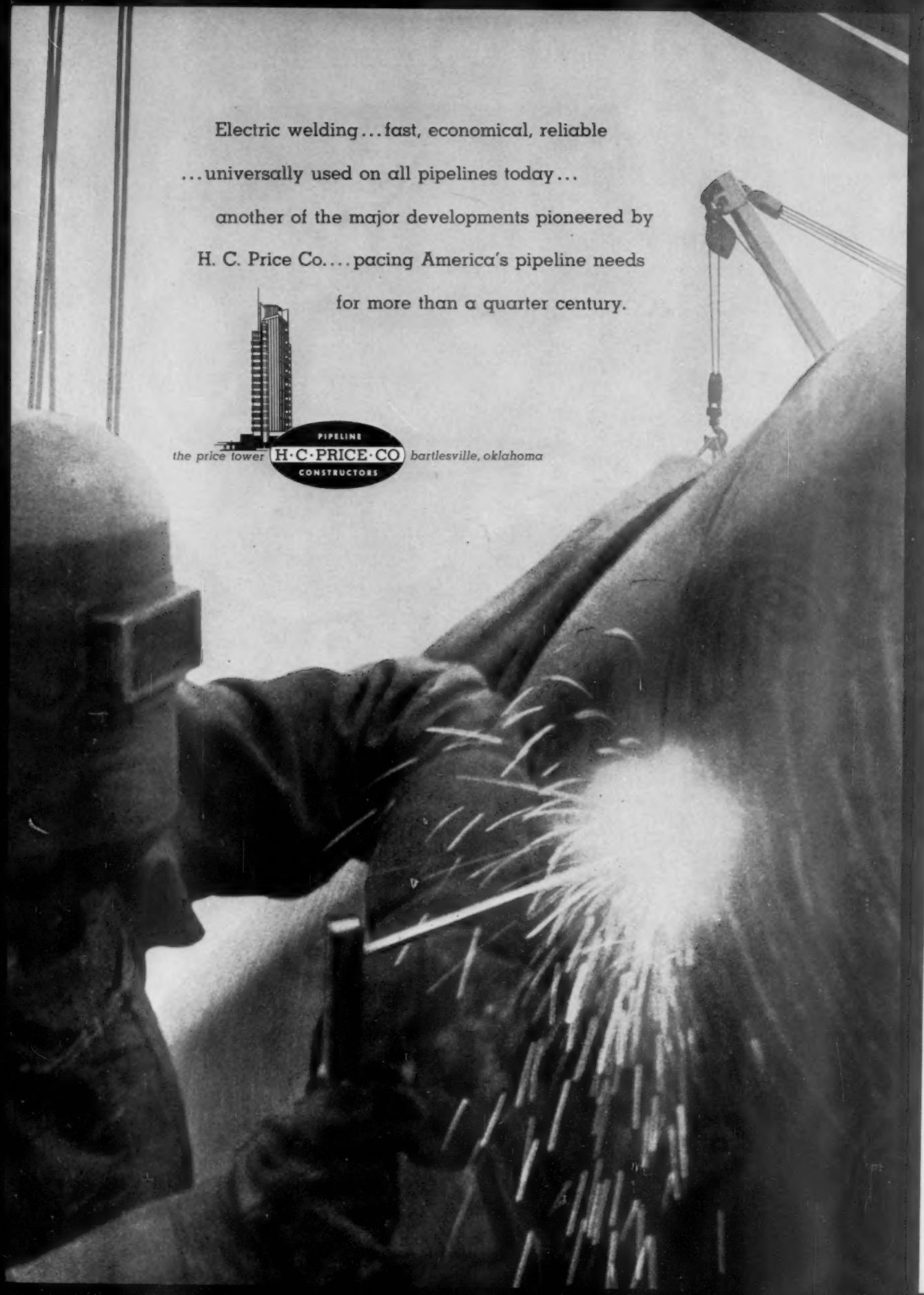
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the OIL AND GAS JOURNAL

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JOURNALLY SPEAKING . . .

It Figures

THE wisemen of Washington have now come to the conclusion that this country has just about passed through the coal age. What lies ahead, they believe, is the chemical age.

At least that's our inference from a recent recommendation of the U. S. Bureau of the Budget that the various federal statistical agencies abolish the classification "Products of Coal and Petroleum" which the Census and others have used for so many years. The plan is to combine these with statistics on "Chemicals and Allied Products."

Thus the oil industry will become a statistical stepchild of the chemical industry, whereas in the past it has been treated as an upstart auxiliary of the coal industry. Maybe that's progress—Government style. Certainly the processing branch of the oil industry is more nearly akin to chemical manufacture than to coal mining.

But the exploration, drilling, production, and pipelining branches aren't like anything else to be found in the industrial cosmos. We have long felt that the peculiar nature of the petroleum industry, plus its size, importance, and rate of growth, entitled it to be treated as a separate industry all by itself. However, the Government doesn't seem to take our advice any more than a lot of other people do.

It really doesn't make much difference, though. The oil industry never did depend much on the Government for anything. When it wants something it goes out and does it itself. Characteristically, it has built up its own set of figures about its operations—probably a more complete and useful set of statistics than any other industry can boast.

Many agencies contribute to this, but the leading factor in the compilation, distribution, and analysis of oil-industry statistics, we say without the slightest blush of modesty, is none other than the Big Yellow Book you are now reading.

Where, we ask, can you find a better record of what the industry has done and where it is headed than in this annual Review and Forecast issue? No place, of course.

Here, between two yellow-fringed covers, is just all about this far-flung, complicated business of oil and gas—the record of the past and the guideposts for the future. And believe you us, the industry would be in horrible shape without something like this. If you can't find something in this issue that has an important bearing on your job, brother, you just aren't in the oil business.

Just thumb through this issue to get the flavor of it and see what's in store for you when you get to working with the details. Notice how the material is arranged and presented for easy use—the simple, informative charts, the detailed tabulations, the easy-reading text that points up the highlights for you.

Note particularly the forward look. These statistics haven't been assembled for the archives. They all point to trends for the future, and we've presented them in a fashion that smart oil men can use to dope out what they had better do next.

The old Greeks, or somebody, had a saying that "What is past is prologue," and this really applies to the oil business. Last year's events simply set the stage for what's going to happen in 1957. Crystal balls are all right in their way, but the soundest method of forecasting what's ahead for business is to keep a close check on what's been going on lately. This takes (1) prompt and reliable statistics, and (2) sound interpretation of the trends. You get both here.

So, as the kids say, it figures. The Government doesn't give this industry the recognition nor the service it deserves. That figures. So the industry relies on its own resources for statistics as for everything else. That figures. It uses the past and current figures to figure its future. And that figures. And the promptest, most complete, most reliable, best presented, most useful, best analyzed, most interpretive record in the entire industry is the annual Review and Forecast issue of our favorite oil publication. That figures, too.

—*Henry D. Ralph.*

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Oil's biggest year —and a few "ifs"

THE best oil year in history is the forecast for 1957. Consumer demand for petroleum products will be up 5.5 or 6 per cent. Imports will be about the same as last year. Operators' plans call for expansion in every division and area of the domestic industry.

Around 60,000 new wells will be drilled, continuing the steady annual increase in drilling of the past decade. The trend toward a higher percentage of wildcats will hold, indicating that operators are not losing faith in the potentialities for new discoveries.

The wildcat success ratio appears to be declining, but last year's successful wildcats opened up unusually promising areas for development, and proven reserves increased comfortably. This proves that much oil can still be found with enough drilling and with advanced methods of exploration and completion techniques.

DON'T LET ANYBODY tell you that the oil industry in the United States has passed its peak and is going into a decline. The record of 1956 and the planning for 1957 reveal a vigorous, aggressive, optimistic industry, an industry that has good reason to see growth opportunity in every direction.

There are problems ahead, of course, and these, too, are evident in the statistics. For example, gasoline production and stocks have been, still are, and seem likely to remain much too high in view of the rate of demand for this product. This forebodes trouble for marketers and refiners, trouble that could spread to producers.

Crude production in recent months has increased faster than the growth of domestic demand, due to the abnormal spurt in exports following the Suez closing. Exports unquestionably will fall off, and if production fails to come down in step there will be trouble in the familiar form of excess crude stocks again.

The old imports problem is not acute at the moment. But the forecast is that by the last half of the year importers will make up their losses of the first half. Resumption of the flow of imports plus continuation of high domestic output could easily push total supply disastrously above total demand.

THE FIGURES LOOK GOOD. Statistically the industry faces a booming year in all departments. Its possible trouble spots are well blueprinted.

What's missing from this picture is the human element. Whether or not the forecast is fulfilled depends on how the men of oil act, on the combined judgment of hundreds of individual operators.

If the industry collectively can hold its optimism within the bounds of the statistical forecast, 1957 will indeed be the biggest oil year in history.

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High yield strength that prevents collapse from external pressures guards every joint of Republic Electric Weld Casing and Tubing. Each tube is furnace-heated to precisely the same temperature throughout its entire length. Known as "normalizing," this process results in a uniform, refined grain structure of the steel with uniform hardness around the entire circumference. Yet, the high yield strength is achieved without sacrificing ductility—another of the important features you can depend on in Republic Electric Weld Casing and Tubing.

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Good Wells Make Good News

These authentic case histories from various sections of the country attest to the fact that ACID PETROFRAC® is a real well saver! Acid Petrofrac is a Dowell fracturing service that combines acidizing and fracturing benefits.

■ ***Barber County, Kansas***—(New well, gas) Operator drilled at the west end of Hardtner field. Found only three feet of the productive Mississippi lime at 4,623-26 feet. Well tested only a show of gas.

After an acid treatment, a 6,000-gallon jelled-crude treatment, and another acid treatment, production was only 1,050,000 cubic feet per day. A 20,000-gallon treatment using Acid Petrofrac, with 20,000 pounds of sand, resulted in an open flow potential of 7,150,000 cubic feet per day.

■ ***Andrews County, West Texas***—(New well) Drilled as an extension to the Fullerton field and completed in Clearfork dolomitic limestone (6,800-7,080 feet). Well showed no production on drill stem test and little production after a 2,000-gallon acid treatment. After treatment with Acid Petrofrac using 15,000 gallons of fluid and 15,000 pounds of sand—down tubing and casing at 15 barrels per minute—well tested 419 barrels per day.

■ ***Fremont County, Wyoming***—(Old well, new zone) A well in the Shelton Dome field had depleted the lower zone. Before plugging, it was decided to give the Embar lime at 6,360 feet an acid-base fracture treatment. (This zone had been acidized and plugged in 1945.) Dowell fractured the well with Acid Petrofrac, using 5,000 gallons of fluid without sand. Well then flowed 21 barrels of oil per hour.

■ ***Harris County, Texas***—(New well) Completed in Yegua shaley sandstone of Rankin field. Perforated from 7,870 to 7,916 feet. Before Acid Petrofrac, well tested only a show of oil and gas. After 9,000-gallon frac treatment with 20,000 lbs. of sand and 250 gallons of temporary plug (Fixafrac*), well swabbed 50 barrels of oil per day.

For fracturing formations that exhibit moderate to high solubility, Acid Petrofrac is unexcelled. In many instances it has given good results where all other treatments have failed.

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The Industry This Week

• **PIPELINING:** Go-ahead has been given for 14-in., 600-mile crude line from Four Corners area to Los Angeles. Builders will be Shell and Socal. P. 125.

The 16-in. Evangeline Products line from Port Arthur to Baton Rouge will be completely automatic when current expansion is completed. P. 135.

• **CONGRESS:** Oil's 27½ per cent depletion allowance gets a good word from Secretary of Treasury Humphrey. He says the allowance is doing what it was intended to do and thus must be all right. That's what he'll tell Congress if asked. P. 134.

A $100-million "crash" program to find new uses for surplus farm crops has been revived by 30 senators. Any new products turned out in the program could be competitors with oil. P. 135.

Oil-for-Europe program is heading for a series of front-page investigations by House and Senate committees. P. 129.

• **EXPLORATION:** Gulf is pulling out of Italy, making good a threat it made 4 months ago. Gulf officials want no part of new Italian oil law which gives government lion's share of any profits from production. P. 137.

Mercedes has an option to buy half interest in Shell's 500,000-acre concessions in the Venezuelan states of Anzoategui and Guarico. Deal calls for Mercedes to pay drilling and other costs over 3-year period. P. 137.

Moratorium on tidelands leasing has been asked by California Legislature. The delay is sought while lawmakers consider proposals to change royalty rate on state leases. P. 124.

Government's request for immediate decision on Louisiana's offshore boundary will be argued before U. S. Supreme Court April 8. P. 133.

• **PRODUCTION:** Texas' wells will produce at an all-time high next month. But the 3,543,672 bbl. daily allowable is still far from what major buyers wanted. Independents won a victory when Railroad Commission decided to keep the lid partially on production. P. 128.

Fourth-ranking U. S. producing company, Stanolind Oil & Gas will have new name February 1 after it merges with Pan American Production Co. New firm will be Pan American Petroleum Corp. P. 133.

• **DRILLING:** Alaska's Yakutat area will get a wildcat test before thaw. Equipment has left California and well should be spudded by March on 1,100,000-acre concession of Colorado Oil & Gas and Frankfort Oil. P. 122.

First wildcat under Turkey's new oil law is drilling below 5,900 ft. The 7,000-ft. well of Turkish American Oil is being slant-drilled under the Mediterranean from an offshore site. P. 138.

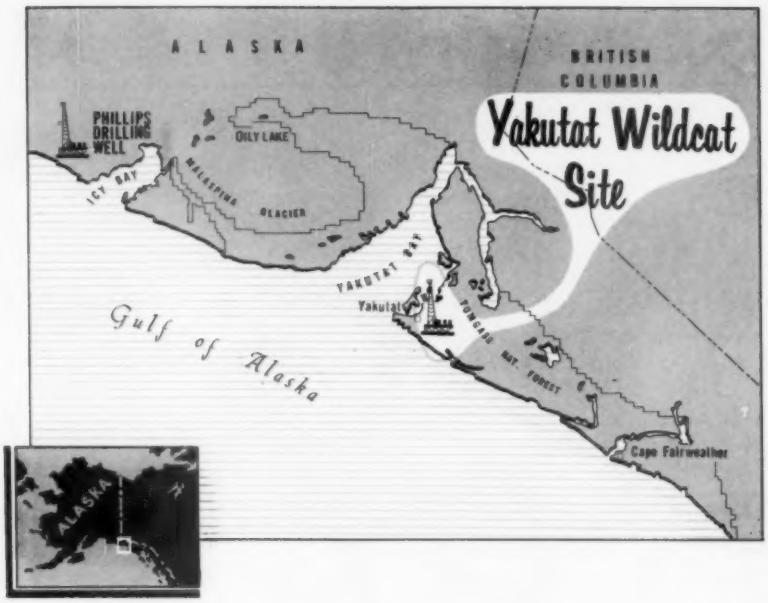
Stepped-up drilling program is planned by Pakistan Petroleum this year. The $6.5 million budget calls for two deep wildcats, completing three now drilling, and a development test in Sylhet gas field. P. 138.

• **REFINING:** Champlin is proving one thing at its Enid refinery: The small processor can use the computer to help stay competitive. P. 126.

The L.P.G. industry needs a late spring more than a severe cold spell to work off excessive stocks. P. 127.

Agreement on building 65,000-bbl. refinery in Turkey has been made by four majors and Turkish Government. P. 137.

Plant to make 30,000 tons of butyl rubber per year will be built by Petroleum Chemicals at Lake Charles. P. 125.



Drillers Off To Alaska

● Equipment leaves California for joint Yakutat wildcat of Colorado and Frankfort on 1,100,000-acre concession

LONG BEACH.—Drilling equipment was loaded here early this month for a wildcat drilling program planned this year in the Yakutat area of southeastern Alaska. The venture is a joint operation of Colorado Oil & Gas Corp. and Frankfort Oil Co.

The Yakutat wildcat is the second scheduled early this year for Alaska. Richfield Oil Corp. plans to start a wildcat in March on a 71,680-acre unitized area in Alaska's Kenai Peninsula *(The Oil and Gas Journal, January 14, page 84)*.

Contract for the Yakutat drilling program was let to Haney & Williams of Long Beach. The contractor assembled equipment capable of drilling to 12,000 ft. It was loaded aboard an LST barge and is now being towed by tug to Yakutat Bay.

The shipment also includes auxiliary equipment such as a cementing unit, logging unit, and electric-log equipment. The barge also carried transportation equipment, adequate spare parts, drilling supplies, and sufficient materials to house the rig for winter operations.

The barge will be unloaded on the beach at Yakutat later this month. Equipment and supplies will be hauled about 3 miles inland over existing roads to the drill site. The well should be spudded by the end of February.

Why the location . . . The drilling site was picked because it apparently offers a structural and stratigraphic test of the upper and middle part of the tertiary section.

Geophysical and geological investigations conducted by Colorado during the field season in 1956 indicated that up to 18,000 ft. of tertiary sediments may occur in the Yakutat area.

Geologists report the Gulf of Alaska tertiary basin is reasonably similar to other basins of similar age on the West Coast of North America. The Ventura and San Joaquin basins of California are examples of prolific oil-producing areas in these basins.

Near Yakutat, tertiary sediments outcrop in places along the coast for some 150 miles. Associated oil crops are common. Numerous porous sandstones also have been observed in outcrop sections, and investigations show that two major unconformities exist in the area.

The first wildcat is projected to about 7,500 ft. It is designed to test a substantial section below the second unconformity.

Local facilities . . . Yakutat is a small fishing village about 170 miles northwest of Juneau.

Fishing is the principal industry. For several years Libby, McNeill & Libby and later Bellingham Canning Co. operated a cannery there. A large number of salmon still is caught in the vicinity and shipped from Yakutat harbor. Some logging also is done in the forests which surround Yakutat.

A large airport is located 3 miles from the village. It was built as a bomber base during World War II. Colorado's base headquarters will be located near the airport. The field is still open. It is operated by the Civil Aeronautics Administration. Commercial airlines use the facilities as well as bush pilots who fly in and out of the region.

Drilling plans . . . Although the wildcat will be spudded late in February, the operators expect no great difficulty because of cold weather.

Temperature at Yakutat seldom drops below zero. Ordinarily during February it gets no colder than 10 to 20 degrees above zero. The greatest inconvenience to drilling operations will be caused by the heavy amount of moisture. Yakutat gets 130 in. of moisture in the form of snow or rain during the year.

It is not uncommon for 50 or 60 in. of snow to fall in one month. However, intermittent rains during the winter melt a considerable amount of the snow. So usually the snow actually on the ground is no deeper than 3 to 5 ft.

Drillers plan to complete the first well early this summer and start a second before next winter. The second location probably will be less accessible than the present site.

More exploration . . . Colorado and Frankfort plan to continue geophysical exploration of the region while drilling is going on.

The companies jointly own leases covering more than 1,100,000 acres. A large part of it is still to be evaluated. Most of this acreage is along the coast between Icy Bay and Cape Fairweather, a distance of 140 miles.

In fact, because of the vast extent of area involved, an exploration program covering several years may be necessary for evaluation.

Company explorers worked in the area last summer. Prior to that there was little geological information available other than work done by the U. S. Geological Survey. Most of this work was in the area north of the Malaspina Glacier near the Samovar Hills and Oily Lake.

However, last year the entire area leased was covered by reconnaissance geology and substantially covered by gravity work. The seismic work completed was confined to the area around Yakutat. Exception was a small amount of work near Dangerous River and

some work in the Dry Bay area 45 miles southeast.

Roughing it . . . The seismic work was done with conventional equipment mounted on 4-wheel drive trucks.

The party was supported by two D-6 caterpillar tractors with Athey wagons. This equipment worked very well in the wooded area where top soil was underlain by gravel at a depth of 1 or 2 ft. The main impediment came from thick timber and deadfall. Trees in the Yakutat area grow to heights exceeding 150 ft. In many cases they have trunks 4 to 5 ft. in diameter. It was impractical to remove trees of this size. As a result lines through the woods meandered to follow trails or other more readily accessible routes.

Work in general was complicated by many small streams, gullies, and several very large rivers. An LCU landing craft was brought in to move equipment along the coast and across the larger rivers. The vessel used is a bow-ramp type of about 150-ton capacity. It draws 2 ft. of water forward and 5 ft. of water aft. It also can be readily beached for landing and unloading trucks, tractors, and other equipment.

Tracked equipment, such as the weasel and bombardier, proved useful for reconnaissance purposes. For this summer, enough tracked equipment will be shipped to Yakutat so all the seismic equipment can be track-mounted.

Terrain near the coast is very flat and always wet from rain or snow. The tracked equipment should increase efficient movement of both seismic and drilling equipment.

The outlook . . . The Yakutat area has excellent shipping facilities should oil be discovered.

The harbor is well protected and ice free. Rapid tanker movement thus will be possible to carry the crude to other Alaskan ports or to the U. S. West Coast. Seattle and the Pacific Northwest market lies only about 1,000 miles from Yakutat.

Phillips Petroleum Co. has sunk three wildcats in the Icy Bay area northwest of the Yakutat test. Two of the Phillips wells were abandoned after promising shows proved noncommercial. At last reports, testing was still proceding on the third.

Richfield Oil Corp., plans its wildcat on the highly regarded Kenai Peninsula across the Gulf of Alaska from Yakutat. Richfield expects to start drilling by March 1 on a 71,680-acre concession in the national moose range. Several other companies who hold leases in the area are closely watching the developments.

Tidewater's Tanker-Building Program

No. of ships	Deadweight tons	Cap. per ship (bbl.)	Length (ft.)	Beam (ft.)	Cruising radius (miles)	Hp. per ship
2	16,000	131,000	514	68	12,000	. . . .
2	27,000	230,000	628	82	17,300	12,500
10	45,000	402,000	733	100	23,000	16,000
4	52,000	461,500	782	102	30,000	19,000
4	65,000	486,000	804	108	25,000	24,000
2	*68,000	506,000	810	109	25,000	24,000

*Estimated.

With 14 more ships on order . . .

. . . Tidewater's Fleet Grows Fast

TIDEWATER OIL CO. is quadrupling its tanker feet.

The firm has placed orders for 14 more supertankers. These and six other tankers soon to be delivered will increase the company's present deadweight tonnage from 320,000 to nearly 1,300,000 tons.

The new orders include:

. . . Eight 45,000-ton vessels to be built in Japan. These will all be assigned to Tidewater's wholly owned subsidiary, Transoceanic Shipping Corp.

. . . Four 65,000-ton ships, also to be built in Japan.

. . . Two 68,000-ton tankers to be turned out in France.

In addition to these proposed 14 vessels, Tidewater is ready to launch four 52,000-ton ships, all assigned to another wholly owned subsidiary, Hemisphere Transportation Co. They include.

. . . The George F. Getty, which is undergoing sea trials.

. . . The Minnehoma, which will be launched this month.

. . . Two others, now under construction in French yards, scheduled for delivery in June.

Tidewater initiated its tanker expansion program 2 years ago, and since then has christened six new ships, two of them in the supertanker class. These include the California and Washington, both 16,000-tonners, built in the United States; the Flying A Norfolk and Flying A Delaware, both 27,000 tons, constructed in the U. S.; and The Veedol and the Wafra, both 45,000 tons, made in Japan.

These 24 recently built or on-order ships will have an aggregate carrying capacity of 8,742,000 bbl. of oil. Although the cost figures have not been disclosed, it is estimated that the 24 vessels will involve expenditure of about $250,000,000.

Tidewater's actual operating fleet today consists of 13 U. S.-built and two foreign-built ships, totaling 320,000 tons. The company also has an inland waterways fleet of seven vessels.

Both Tidewater subsidiaries—Transoceanic and Hemisphere Transportation—will fly foreign flags. This is a policy followed in varying degrees by all oil companies because of the much cheaper cost of operating.

A comparable factor dictates construction of ships abroad. Building vessels on this large scale in U. S. yards could add about 50 per cent to the total cost.

None of the ships is scheduled for fixed service. They are primarily intended to serve Tidewater's two big refineries—the existing 114,000-bbl. plant at Avon, Calif., and the 130,000-bbl. plant under construction at Delaware City, Del. The Delaware plant will go on full stream early this spring. It will have the largest initial capacity of any refinery operating.

Supertankers must be lightered when delivering to Avon, but Delaware City is equipped with a turning basin 40 ft. deep which will accommodate many of the large ships.

Tidelands leasing moratorium sought . . .

. . . Royalty Battle Flares in California

SACRAMENTO. — A hectic battle centering around efforts to change royalty provisions in California's offshore leasing law is shaping up in the legislature here.

Dissatisfied with the flat 12½ per cent royalty provided for wildcat leases, the assembly last week adopted a resolution asking the State Lands Commission to halt further leasing of state tidelands. The moratorium would prevail while it considers a royalty rate which scales upward from 12½ per cent. The cash bonus feature would be kept, however.

This and other measures introduced in the 3-week-old session promises to give it a decided oil flavor. Within 2 weeks after the session opened oil bills introduced included:

. . . A conservation measure (Bill 166). It provides for controlled well spacing, compulsory unitization, control of underground waste, and nearly all other provisions of initiative Proposition 4 which was defeated in last November's balloting.

. . . Unitization or acreage pooling measures. At least eight bills covered these subjects.

One would permit state lands to be pooled where more than 80 per cent of the working interest desired such action. Most, however, required a 75 per cent majority. One bill backed by the city of Long Beach would permit city properties to be unitized with those of other operators in the harbor area of Wilmington field. This is necessary if large-scale waterflooding is to be carried out to check land subsidence.

. . . Proposals to use oil revenue to build water facilities. This was the subject of numerous bills and resolutions. In the main, they proposed to use accumulated and future oil income from state submerged lands to bring Feather River water to water-short southern California.

. . . Changes in rules for wildcatting on state's submerged lands.

The big battle . . . The hottest fight in the legislature will center around proposed amendments to the Cunningham-Shell Act, passed in 1955 to open California's offshore lands to wildcat drilling.

Several bills, backed by the State Lands Commission, would:

. . . Increase royalty rates. The state's royalty would begin at 12½ per cent on "wildcat" acreage.

. . . Lift secrecy on exploration information. This proposal would require operators to make available to the commission all geophysical and geological information they learn from their offshore operations.

. . . End compulsory leasing. This would relieve the commission of its duty to offer submerged lands for leasing in instances where there is no question of impairment of shoreline recreational or residential areas.

Under the Public Resources Code, the commission is required to determine if submerged lands to be offered for leasing are on "a known geological structure." If not, they must be offered as wildcat acreage. The royalty is a flat 12½ per cent. If they are on structure, the commission has two choices: Fix a flat royalty of 16⅔ per cent. Prescribe a sliding scale royalty starting at 16⅔ per cent.

This provision is causing the commission most of its legislative and court difficulties. In court the commission is being charged with using improper methods for classifying submerged lands. And a vocal group in the Assembly believes the commission cannot properly determine what is wildcat acreage. Even so, the legislators claim the royalty rate should be increased.

The lawmakers also have criticized the commission for ignoring a request to halt all offshore leasing until the legislature has time to consider proposals to change the royalty scale. Last week this pressure on the commission resulted in postponement on opening bids for a 5,500-acre parcel offshore from Point Mugu. Bid opening was postponed from January 18 to January 30.

A commission spokesman said it has been caught in a squeeze play: "We are in the paradoxial position of being attacked for administering a law passed by the very people now attacking the commission."

The royalty proposal . . . Bills backed by the commission staff would eliminate the flat 12½ per cent royalty for wildcat acreage.

All lands, regardless of their structural location with reference to a producing field, would be placed on the same royalty basis. The commission could set a flat royalty of not less than 12½ per cent. Or it could use a sliding scale beginning at that figure and going up to whatever maximum royalty rate the commission chooses.

Reason for the proposed change, supposedly, is to remove the difficulty the commission encounters in classifying lands. But the problem will still remain. R. T. Patton of Shell Oil Co. stated at a recent commission hearing:

"Whether or not the proposed minimum-fixed royalty or sliding-scale royalty was to be used would depend upon the staff's own appraisal of the prospect. In the case of what might look like a really 'hot' play, a sliding scale royalty with steeply mounting rates would be used.

"There would still be the problem of evaluating wildcat prospects for the purpose of determining what royalty to apply to them. The proposed amendment would merely remove the safeguard of the established yardstick now provided in the law and leave the matter to the staff's opinion, however conscientiously arrived at.

"The optimistic application of a high royalty, and particularly a steep sliding-scale royalty, to a purely wildcat prospect in advance of demonstrated productivity completely ignores the high cost of exploratory drilling. Actual productivity or nonproductivity of a geologic structure can be determined only by exploratory wells.

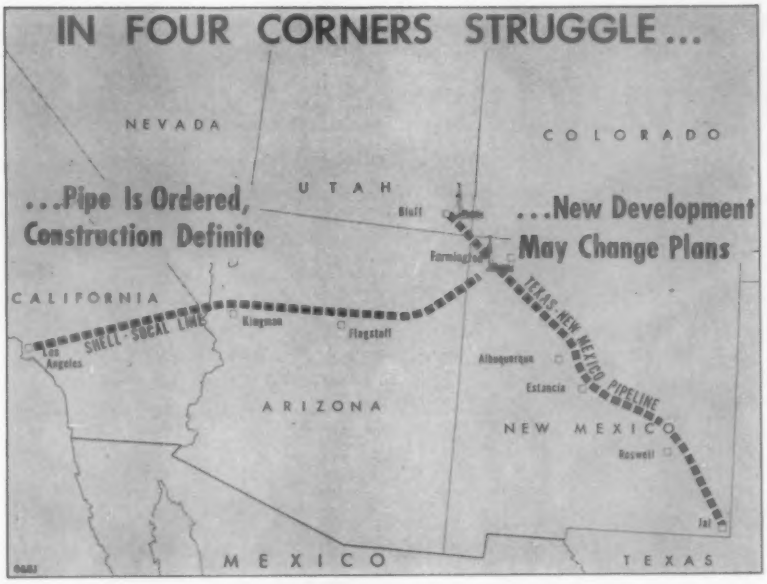
"The amount an operator is willing to bid as a cash bonus is directly affected by the royalty he must pay on production from the lease. The higher the royalty burden, the lower the cash bonus bid.

"A sliding-scale royalty is an even greater deterrent to high bonus bidding, particularly on wildcat lands. Royalty costs cannot be determined until the lease has been substantially drilled up. The operator is bound to 'hedge' on his cash bonus bid to protect himself against the uncertain royalty costs."

Incentives gone? . . . The Western Oil and Gas Association is carrying on the industry's fight to keep the present law intact.

A spokesman declared the change would strike down the very incentive the legislature put into the act to encourage offshore wildcat drilling.

Similar industry opposition is being expressed to the proposal to share all geological and geophysical data learned from offshore prospecting. Primary reason is this: After spending huge sums of money in gathering the information, a company should not be required to turn it over to the Lands Commission.



Line to West Assured

● Shell and Standard of California sign up steel slated for automobiles, apparently winning fight to build outlet for bustling Bisti-Aneth area.

NEW YORK.—The go-ahead to start a 600-mile crude pipeline from the Four Corners producing area to Los Angeles was reportedly received last week.

Shell Oil Co. and Standard Oil Co. of California will build a 14-in. line with initial capacity of 50,000 bbl. per day. Construction is to start this year, as soon as pipe is available. Capacity will be doubled when production warrants by the addition of pumping stations.

Other companies also may share in the line. The project will provide an outlet for the growing reserves of the Paradox and San Juan basins and make them available to California, which has a crude deficit of 165,000 bbl. daily now being made up by imports.

The decision to go ahead with the line to Los Angeles is the latest development in the tug of war over which direction the crude would be moved (see map).

Competition for crude . . . Shell and Standard of California disclosed 3 months ago that the line westward was under consideration *(The Oil and Gas Journal, October 22, 1956, page 74)*.

But the question of when—or if—it would be built remained unanswered for two reasons. First, there was the problem of procuring pipe at a time when mills are booked up to 1960. There was also a split among producers over where the crude should be marketed.

Texas-New Mexico Pipe Line Co. (Tidewater, Texaco, Sinclair, Cities Service) announced it would lay a 50,000 - bbl. line 515 miles to Jal, N. M., to link with carriers to the Gulf Coast and Mid-Continent *(The Oil and Gas Journal, December 24, 1956, page 35)*. Surveys were to start this month. Northwest Pipeline Corp., a Pacific Northwest Pipeline Corp. subsidiary, also announced plans for a 15,000 - 25,000-bbl. crude and raw-products line from the same area to the Salt Lake refining center.

It appeared the issue would be settled by which company obtained pipe first. And last week it was reported that Shell purchased some 70,000 tons of steel in the Great Lakes area which originally was scheduled for automobile production. Shell arranged for A. O. Smith Corp. to fabricate the pipe. The tonnage would be sufficient for the entire line. Texas-New Mexico was believed to be unable to get a firm commitment before 1959 or 1960.

The feeling now is that there is justification for only one 50,000-bbl. line from the area initially, although the reserves and production picture may be altered later. The status of the Northwest Pipeline project is uncertain. The company said it would build the line this year. Pipe is to be delivered by the end of 1957.

Development stimulus . . . When the pipeline project gets under way, the Bisti-Aneth area will become one of the hottest development spots in the nation.

These two fields have not been defined, and thus no firm reserves figure is available. However, the potential of the area opened up by these discoveries is estimated at up to half a billion barrels.

Aneth has only 24 wells, averaging 100 bbl. per day. Late last year there were 62 wells in Bisti and average production was 50 bbl. per day. Combined production from the two fields now is only 4,400 bbl. per day. A feverish drilling program of some 500 wells would be necessary to raise producing capacity to the 50,000 bbl. daily needed for the pipeline, which would require up to 2 years to build.

Rubber Plant Set

Expansion will be fourth for Petroleum Chemicals

LAKE CHARLES, La.—Cities Service Co. and Continental Oil Co. announced plans last week for the fourth major expansion of their petrochemical installations at Lake Charles.

Their jointly owned affiliate, Petroleum Chemicals, Inc., will build a plant here to produce 30,000 tons of butyl rubber per year. Bruce K. Brown, Petroleum Chemicals president, said it will be the first such plant to be built since World War II. It will increase the nation's production capacity for butyl rubber by about one-third.

The new plant will cost more than $17,000,000 and will be designed for possible later expansion by 50 per cent.

Petroleum Chemicals will operate the plant under license from Esso Research & Engineering Co., subsidiary of Standard Oil Co. (N. J.), which built and operated two wartime plants.

Contract for construction of the butyl plant has been let to Foster Wheeler Corp. The new unit will occupy a site adjoining Petroleum Chemicals' other petrochemical plants here.

Like the other units, the new plant will draw its raw materials from hydrocarbon streams at the Cities Service and Continental refineries nearby.

Brown said he hoped the plant will be able to reach full production before January 1959.

In tough race to stay competitive . . .

. . . A Small Refiner Turns to Computer

Champlin solves blending, process problems; keeps plant balance with tool

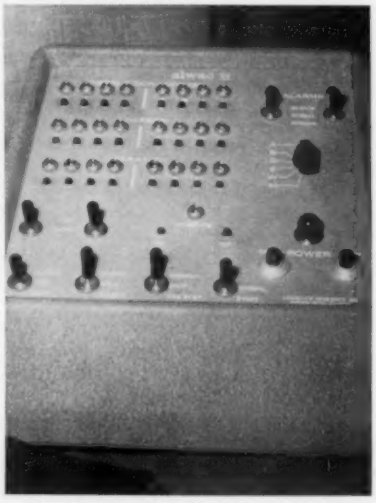
ENID, Okla.—Large refiners don't have a corner on use of the electronic computer. The trend now is for smaller refiners also to use this new tool. It is helping them stay competitive in one of the toughest phases of the oil industry.

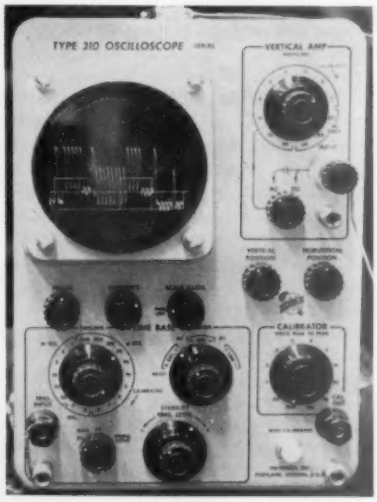
Champlin Oil & Refining Co. is an example of this development. This tightly managed company has installed a digital computer at its 23,000-bbl. Enid refinery. The mechanical mathematical wizard is known as ALWAC IIIe. It has been a boon in solving such headaches as blending and processing problems, chemical computations, and plant balances.

In a matter of minutes, it solves problems that formerly took hours, days or perhaps weeks using desk calculators and other computing machines.

Lee Whitney, Champlin vice president of manufacturing, sums up use of the computer this way: "Primarily it makes much more information readily available to us than we previously could obtain. Time spent in developing an answer to a problem, for instance, is now spent in solving other problems or improving our operations."

COMPUTER ON STREAM at Champlin's Enid refinery creates a huddle of, left to right, Byron Horton, chief of I.B.M. equipment; Earl Walker, administrative assistant to refinery manager; Earl Beebe, refinery manager; Lee Whitney, vice president for manufacturing; and Ray Larsen, customer-service engineer for the manufacturer.





ONE-MAN CONTROL is provided through small control panel, left, and the oscillograph, right.

Why it's important . . . Having answers readily available is extremely important these days in running an efficient and modern refinery, Whitney says.

Without it, the operator is almost groping in the dark. He must rely on speculation and assumption for programming.

Whitney gives this example: "You put thousands of barrels of crude oil through your equipment in a day with the expected result of obtaining various amounts of finished products. However, unless your program for running these barrels is accurate so that you get the maximum return for input, at the most efficient level, you may be operating at a cost higher than necessary."

That was the basic problem Enid refinery officials faced a little less than a year ago. They had seen the refinery go through a series of rapidly changing demands. They were increasing the quantity and quality of products. And with several million dollars worth of new equipment and units on stream, there was no room for programming the refinery operation purely on a speculation basis.

Nor was there time to try out assumptions by relying upon conventional accounting methods. The Enid operators had to have a tool that could take various operating assumptions, run tests for best efficiency, and come up with a detailed picture of most economic operating level. All this had to be done quickly.

The tool . . . A high speed digital computer seemed the answer.

Champlin put a team to work investigating and experimenting with various computing methods. The refinery's own immediate problems were analyzed and

extensive tests made. Finally it was decided the ALWAC IIIe system manufactured by Logistics Research, Inc., fitted the needs at Enid.

In appearance, this system is a neat and compact unit. It requires only about 15 ft. of floor space to house its four steel cabinets and other vital parts. It can be operated by one man sitting at a control desk. He can insert information either from one or a battery of typewriter keyboards or from punched cards.

Results are produced automatically at a fantastic speed as a printed page with complete form control, on a paper tape for later automatic typing, on punched cards, or on magnetic tape files.

Initial problem . . . The problem picked for programming once the unit was installed at Enid was establishing the optimum cost of octanes.

Two men were assigned to the task. They were Byron Horton, who is in charge of the company's I.B.M. equipment, and Earl Walker, administrative assistant to Refinery Manager Earl Beebe.

These men got the assignment because of one factor: The computer's ability is totally dependent upon the accuracy and reliability of the information which is fed into it. Both men were intimately acquainted with the results desired and they knew the computer they were working with.

Horton explained one hazard: "The machine knows no problems itself. Nor does it know how to solve any problem until the appropriate sequence of instructions has been fed into it. A common shortcoming is to try to put only a portion of the problem in it and also overlook some minor step in logic or in the solution of the problem."

The first problem for the Enid plant was approached with what Walker described as "little emphasis on elegance of solution." It was designed so the computer would give quick and reliable answers based on predetermined gasoline pool requirements and a balanced refinery operation.

Walker explained further what was involved: "We also made provisions for using surpluses and deficits for such operations as the best Platformer charge rate, the best Platformer octane level, best cat cracker charge and conversion rate, etc. The result was that optimizing these variables with proper relation to each other would give the greatest returns to the refinery."

Other problems . . . Success with this initial problem naturally led to solving others.

The biggest of these was computing components and quantities of each component that must be blended to produce the desired barrels of premium and regular gasolines without disturbing the minimum cost already computed.

"This particular problem," Walker said, "had been almost impossible by conventional calculating methods."

At the present such assignments as the "general refinery problem" and mass spectrometer problems are being handled on a daily basis. The general refinery problem consists of obtaining general estimated cost for daily operation as against general estimated profit for the month. Prior to installation of the computer, these problems took hours to work out by calculators.

"Mass spec problems, for instance," Walker said, "were relegated to only three or four analyses a day, and then we were going some. Now we can handle up to as many as 12 a day if we want."

It's flexible . . . The computer is not used solely by the refining department. Horton has applied it to other company problems.

He has used it to handle daily gas measurement readings and scheduling deliveries on the products pipeline.

Here's an idea of the time savings involved just in handling gas measurement charts. Computations for one chart now can be made in 6 seconds. Formerly it took 4 to 5 minutes per chart.

Late spring would end dilemma:

. . . Too Much L.P.G. In One Spot

SUPPLIERS and marketers of liquefied petroleum gas welcomed cold weather in the first half of January. But they need at least two more months of below-normal temperatures to help work off the inventory surplus on hand at the end of the year.

Total L.P.G. stocks at plants, terminals, and in underground storage at the end of December were more than twice those reported for the end of 1955. Stocks at the end of 1956 amounted to 567,430,000 gal. for a gain of 285,781,000 gal. over the previous year. The total for all L.P.G. at the end of 1955 was 281,649,000 gal.

A study of these inventories (see small tables) shows one disturbing factor: At the end of last year PAD District 3 had almost 80 per cent of all L.P.G. stocks. Much of this was in salt-cavern storage in areas near points of production. This fact tends to limit the volume of L.P.G. that can be moved by the end of March.

Very cold weather is needed to reduce inventories to normal operating levels. But, any period of subnormal temperatures long enough to correct the inventory surplus would bring a definite shortage in tank cars. Some suppliers reported transportation difficulties during the cold waves that came in the first half of January.

Data from the accompanying tables indicate that demand for L.P.G. from plants during December was almost the same as for the corresponding period of 1955. Production for December 1956 was up 39,341,000 gal. from December of the previous year, but the gain was offset by a drop in stock withdrawals amounting to 39,742,000 gal. All of the extra production in December went to storage.

This division of the oil industry needs at least normal stock withdrawals plus 50,000,000 gal. for both January and February combined. It also needs a late spring to limit additions to stocks during March and April.

PRODUCTION AND STOCKS OF LIQUEFIED PETROLEUM GAS*
(Thousands of gallons)

Production

	Dec. 1956	Dec. 1955
Propane	284,111	282,363
Butane	143,924	127,172
P-B mixture	71,716	60,821
Isobutane	41,001	36,035
Other mixture	63,568	58,588
Total	604,320	564,979

Stocks

	12-31-56	12-31-55
Propane	383,211	162,287
Butane	153,198	91,558
P-B mixture	18,800	18,371
Isobutane	10,124	7,761
Other mixture	2,097	1,672
Total	567,430	281,649

Stock Changes

	Dec. 1956	Dec. 1955
Propane	—80,976	—107,944
Butane	—6,337	—14,349
P-B mixture	—5,453	—10,311
Isobutane	—1,579	—1,315
Other mixture	268	100
Total	—94,077	—133,819

Stocks by Districts

	12-31-56	12-31-55
District 1	7,955	3,063
District 2	98,917	54,432
District 3	450,842	214,474
District 4	7,835	7,668
District 5	1,881	2,012
Total	567,430	281,649

*From Bureau of Mines and A.P.I.

Texas Kicks Up Oil Flow

● Record allowable of 3½ million barrels daily is still far less than major buyers asked to meet Europe's need; independents win their fight for production restraints

AUSTIN.—Texas will produce oil at an all-time high rate next month.

The state allowable for February initially will be 3,543,672 bbl. daily, more than 78,000 bbl. daily above the record high set early last year.

The February allowable, however, still will be far under what major purchasers would have preferred.

The Texas Railroad Commission, beleaguered by opposing arguments of major buyers and independent producers, finally settled on a 15-day flow schedule for February.

The new pattern will produce allowable increases of 111,481 bbl. daily over the figure in effect January 5 and 138,672 bbl. higher than the initial January allowable. Nevertheless, it is the smallest increase the commission could grant.

Maintaining January's 16-day flow pattern next month would have meant raising the allowable about 275,000 bbl. daily over that of January 5. A 17-day pattern would have brought an increase of 440,000 to 450,000 bbl. On the other hand, 14 producing days would have meant cutting the allowable about 50,000 bbl. daily.

Majority of the crude buyers wanted 17 producing days. Some of these (Humble Oil & Refining Co., Atlantic Refining Co., Magnolia Petroleum Co., Shell Oil Co., and Sun Oil Co.) asked that the January allowable be hiked to 18 days for the rest of the month.

The other buyers all sought at least 16 producing days in February. Most of these indicated they could handle 17 days without difficulty.

Independents win again . . . The commission's ruling was another clear-cut victory for Texas' independent producers, who wanted production restraints.

The latter were at the hearing in force. They pounded away heavily at excess gasoline stocks, unconnected wells, and pipeline proration.

They presented detailed charts and testimony showing that gasoline stocks are far too high, that total stocks of crude and products are likewise well above desired levels. For these reasons they opposed unrestrained production.

Burdensome gasoline stocks, they said, constitute waste. Freeman Burford of Dallas, president of Sid Richardson Refining Co., testified that the loss of gasoline in storage due to evaporation is at least as great as for crude oil. Gasoline quality, he said, declines because gum content increases. "Gasoline stocks 17,000,000 bbl. above a year ago pose a dangerous hazard to the industry."

Burford also said that it would be practical for refiners to cut gasoline production by 25 per cent and hike yields of distillate — by the same amount. They could do this, he said, by making adjustments in equipment.

Pipeline problem . . . Representatives of nearly every producer association in Texas presented figures at the hearing on wells unable to obtain pipeline connections, on pipeline proration, and on the necessity for trucking much of the oil.

Statements urging the commission to set a 14-day producing schedule, or at most a 15-day pattern, were filed by:

The Texas Independent Producers and Royalty Owners Association, the West Central Texas Oil and Gas Association, the North Texas Oil and Gas Association, the Panhandle Producers and Royalty Owners Association, and the East Texas Oil Association, along with statements from individual producers.

The producers agreed that few if any of the unconnected wells had been connected to pipelines since the last hearing in December. Many of these wells are near, sometimes even adjoining, production (and pipelines) owned by major companies, they said.

Squeeze tightens . . . On the other hand, the crude buyers reported a tightening squeeze on crude supplies.

Humble's Herman Pressler said his firm had been able in January to supply only 1,038,000 bbl. to Europe of the 5,528,000 bbl. for which the company had tanker nominations.

"This means that vessels with a capacity of 4,490,000 bbl. now are being diverted to the Middle East around the Cape of Good Hope."

Pressler said Humble had been able to keep its pipeline system from West Texas to the Gulf Coast full only by pulling down its field stocks to the lowest possible level. There will be idle capacity in the system in February, he said, if the commisison "orders less than 17 days."

A spokesman for Atlantic Refining Co. said it also is hard-pressed for crude. He said Atlantic will have depleted its West Texas storage to 370,000 bbl. by February 1. Its desired level in the area is 700,000 bbl.

Atlantic, he said, had raised its pipeline capacity from West Texas by 11,000 bbl. daily with the idea of replacing Middle East crude now used with Texas oil as of January 1. He said the company has tried to buy 6,000 bbl. daily since October but has been unable to find it, and the situation may force the company to fill its needs from outside the U. S.

Magnolia said it had been depleting its stored crude at a rate of 32,000 bbl. a day in January.

FEBRUARY TEXAS ALLOWABLE

District—	Feb.	Increase over Jan. 5
1—Southwest	66,967	1,502
2—Gulf Coast	161,033	6,511
3—Gulf Coast	498,914	11,792
4—Southwest	259,502	4,921
5—East Central	46,672	1,062
6—Outside E. Texas field	147,923	5,916
6—East Texas field	217,549	6,924
7-B—North Central Texas	203,913	6,748
7-C—W. Central Texas	203,745	7,316
8—West Texas	1,316,470	48,221
9—North Texas	280,892	7,181
10—Panhandle	140,092	3,387
Total	3,543,672	111,481

Richfield Buys Site

Washington refinery to be built northwest of Everett

LOS ANGELES.—Richfield Oil Corp. has bought or taken option on 1,000 acres of land 14 miles northwest of Everett, Wash., for construction of a refinery. Plant size or construction dates were not announced.

The site includes Kayak Point at Port Susan, accessible by improved roads and by water with depths capable of handling any size tanker. Crude will be tankered in or shipped by Trans Mountain Oil Pipe Line Co. from Alberta.

Richfield pointed to the rapid population increase and industrial growth of the area as the reason for its new plant in the Pacific Northwest *(The Oil and Gas Journal, December 24, 1956, page 32)*.

The Richfield project is the second recently announced refinery for the Everett area. Standard Oil Co. of California will build a $65-million plant on a 2,400-acre site at Everett. Capacity is undetermined, but will range from 60,000 to 100,000 bbl. daily.

Other refining activity in the Puget Sound area of Washington shows that:

. . . The Texas Co. will begin work

soon on a 35,000-bbl. refinery at Anacortes.

. . . **General Petroleum Corp.** is currently expanding its 37,000-bbl. plant at Ferndale by adding 11,000 bbl. to its capacity.

. . . **U. S. Oil & Refining Co.** is nearing completion at its 15,000-bbl. refinery at Tacoma.

Oil Probes Planned

Congressmen may pry into price hikes, aid-to-Europe

WASHINGTON.—House and Senate committee leaders are laying plans for front-page investigations of the shape and effects of the oil-for-Europe program.

Support for the probes is steadily mounting. Congressmen have received a large number of complaints against product price increases. These have come not only from individual consumers, but from public utilities, trade associations, and other organizations.

The views expressed in these complaints . . . that stocks are at high levels, higher prices are not justified, the industry is "profiteering" . . . are reflected in the many speeches in the House and Senate. Most have been critical either of the government-industry program or of the price increases. Few have defended the industry.

It was apparent this week that the inquiry will be approached from at least two directions, and possibly more. Several have been suggested. Just how many investigations finally are made will depend upon how many committees want to get into the act.

What's involved . . . A number of studies already have been asked in resolutions or statements of intent. Several of these call merely for investigation of gasoline price increases. At least one such inquiry is already scheduled, by a House small business subcommittee some time next month. Other proposals go further.

A House banking committee study of the need for standby oil price controls "to guard against profiteering during the Middle East crisis" is proposed by Rep. Charles A. Vanik of Ohio.

Sen. Joseph C. O'Mahoney of Wyoming has declared his intention of studying the manner in which oil is supplied to Europe. He calls for full government control of the oil lift. He also attacks the recent price hikes.

He has not disclosed whether the probe will be made by the Senate judiciary committee or the interior committee, neither of which have yet organized. O'Mahoney is a member of both.

watching WASHINGTON

. . . with Bertram F. Linz

Shale shuffled back to Interior . . .

NAVY DEPARTMENT hopes of getting into research on oil shale were given a sharp setback in President Eisenhower's budget this month.

The experimental plant at Rifle, Colo., which was transferred from the Interior Department to the Navy last year, is to be switched back to Interior next July 1, the budget disclosed.

The decision was a big blow to the Navy. It had interested the House armed services committtee in the idea and was hopeful of getting funds for the work. Only a few days before the budget went to Congress the committee had asked the department to come up with a clear-cut program.

The big shale reserves in the Rocky Mountain area are seen by the Navy as a future major source of heavy fuel oil. This oil, available to the West Coast, would be important in planning against another war. It is estimated that the government reserve might produce as much as 900 million barrels.

Recent events indicating that commercial shale-oil production is at least on the threshhold of feasibility have greatly encouraged department officials. They are more concerned with production of heavy burning oil than with gasoline for naval use.

Although the Interior Department will get the Rifle plant back this year, it has no present plan for putting it into service. No funds for that purpose were requested in the budget. And department plans at the moment call for nothing more than maintenance on a stand-by basis.

From grain to motor fuel . . .

THE Agriculture Department may be shoved into research on motor fuel from surplus crops in a big way.

A big government grain alcohol plant at Omaha would be turned over to the department for that purpose under bills now in Congress. The plant was built during the war to supply feed stock for synthetic rubber butadiene.

A broad program of research on new industrial uses for farm products is now being drawn up by a presidential commission set up last year. Alcohol for blending with gasoline has always been one of the major outlets for surpluses mentioned in this connection.

The transfer of the Omaha plant is being pressed by the two senators from Nebraska. Last year, they had the General Services Administration hold up plans to sell it while they tried for congressional action.

The production of motor fuel alcohol from farm crops has long been the dream of Midwest congressmen and farm groups.

White elephant still around . . .

ALL ideas of keeping the Louisville alcohol-butadiene plant in the synthetic rubber industry have been dropped. Nobody is interested in buying or leasing the plant for operations for which it was built during World War II.

The rubber disposal commission couldn't sell the plant. It leased it for 3 years. Then it tried to sell again but Congress turned the deal down. The Federal Facilities Corp., which took it over last year, tried for a long-term lease. It got no satisfactory offers.

To get rid of the white-elephant plant, which now is pretty obsolete, Rep. Carl Vinson of Georgia has written a bill that would allow a purchaser to do whatever he wanted with it. The sale would be outright. That is, the plant would not be subject to reconversion to butadiene emergency in the event of another war.

Publicker Industries, Inc., the lessee, and Union Carbide & Carbon Corp. are both interested in buying the plant. But neither wants to be tied to the production of butadiene.

Canada's Potential Great

● Imperial president tells security analysts to expect production of 2-3 million barrels daily by 1980; this will require $20-billion investment in next 25 years

NEW YORK.—Canadian oil is a growth industry with bright prospects. It should grow four or five times its present stature by 1980.

That's the optimistic prediction of J. R. White, president of Imperial Oil, Ltd., who last week addressed the New York Society of Security Analysts.

White gave the security men this picture of Canadian oil outlook by 1980:

. . . **Crude reserves** should rise to 13.3 billion or 17.4 billion barrels. The increase will depend on whether reserves are projected on the basis of currently proved or proved plus probable.

. . . **Production potential** should be 2.8 to 3.8 million barrels daily. The probable actual production should be 2 to 3 million barrels.

. . . **Investment required** for this growth will total "some $20 billion" over the next quarter of a century. This breaks down to $14 to $18 billion for exploration and development and $3 to $4 billion for other phases.

J. R. WHITE
. . . Sees a giant in the making.

Only 10 years old . . . Canada's stature in the oil industry actually began to rise with the discovery of oil by Imperial at Leduc in the Alberta plains in February 1947.

Construction of the Interprovincial pipeline 4 years later opened Leduc to markets of consequence, White said. It delivered crude to the Great Lakes at Superior, Wis., was later extended to Sarnia, Ont., and is now being lengthened to Toronto.

Opening of the Trans Mountain line to Vancouver and the Puget Sound in 1953 opened U. S. Pacific Coast markets to Canadian crude. This, in part, balances the importation of crude by Canadian eastern refineries.

Potential big . . . At year's end Canada's production averaged 494,000 bbl. daily. Its production potential was 860,000 bbl. daily.

The shut-in production could be reduced if Interprovincial were extended to Montreal, White said. Montreal is 350 miles farther east and has refining capacity of 247,000 bbl. daily. It now is supplied with ocean-borne crude from Venezuela.

But extension of Interprovincial is an unlikely prospect. White gave these reasons:

. . . **Interprovincial is full** already. This means that an entirely new line, 2,300 miles in length, would have to be constructed—not just an extension.

. . . **Venezuelan oil** still would hold competitive edge. Western Canadian crude laid down at Montreal would be competing with Venezuelan crude which is benefited by low-cost tanker transportation. An extension of Interprovincial, thus, could cost more than it would be worth.

Pembina's price . . . White explained to the security analysts why Pembina crude received a smaller increase in last week's new price postings.

Pembina got only a 13-cent increase while most other Canadian crudes enjoyed a boost of 18 cents a barrel.

White said this difference reflected refinery experiences with the various crudes. He said refiners felt Pembina crude was over-priced in relation to the others.

The energy picture . . . Canada's daily average production is low in relation to its production potential. And this won't change until after 1960, White declared.

The Imperial president said he expects production by 1960 to reach 605,000 bbl. daily with a production potential of 1,380,000 bbl. daily.

This excess, he said, is not out of line with world conditions. It is a consequence of developments of the past 10 years.

Canada's demand for energy has grown in these 10 years and will continue to grow. At the same time, oil's share of these growing energy requirements is rising even faster. Total energy requirements have gone up 53 per cent in the decade from 1946 to 1956, and petroleum requirements have gone up 224 per cent.

Per capita consumption in this period rose from 6.6 bbl. to 16.5 bbl. and is now 85 per cent of the comparable U. S. figure. The United States has the world's highest per capita consumption rate.

This increased demand resulted from a growth in:

. . . **Motor vehicles** registered from 1.6 million to 4.2 million.

. . . **Oil-heated homes** from less than 0.5 million to 1.8 million.

. . . **Tractors** from 229,000 to 469,000.

Prospects for new oil . . . Canada's ability to satisfy this growing consumption will not be lacking.

While the area being explored and the number of exploration parties have dropped somewhat, spending on exploration and development is at an all-time high. At the end of 1956 there were 191,000,000 acres under lease. This is off a bit from 1952 but 10 times the 1946 total of 20,000,000.

Geophysical surveying parties numbered 157 at the end of 1956. This compared with 189 in 1952 and only 11 a decade ago. Expenditures, however, have gone right ahead. They were up to a healthy $550 million last year against $326 million in 1952 and a meager $12 million in 1946.

Production . . . Canada's crude production averaged 467,000 bbl. daily for all of 1956 and wavered around 500,000 bbl. daily at the end of the year.

This was almost treble 1952's average of 167,000 bbl. daily and a far cry from the 1946 average of only 19,000 bbl. daily.

Reserves are rated at 2,700,000,000 bbl., a figure which could be increased as much as 1,300,000,000 according to interpretation of the word "proven." This would place the country's reserves at from 15 to more than 20 years supply at the current rate of production.

Sales . . . Canada's economic progress is reflected in Imperial's sales.

Product sales averaged 108,000 bbl. daily in 1946 and grew to 277,000 bbl. in 1956, an increase of 157 per cent. The company's crude runs increased

proportionately from 111,000 bbl. daily to 273,000 bbl.

Imperial's crude production has jumped much faster, but it is still short of the company's needs. From a mere 1,000 bbl. daily in 1946, it grew to 55,000 bbl. daily in 1951. It has almost doubled since to 102,000 bbl.

The company's crude reserves were 720,000,000 bbl. as of August 31, 1956, about 20 per cent above the 1952 total of 590,000,000 bbl. They were 19,000,000 bbl. 10 years ago.

Imperial spent $484.6 million in the 5-year period, 1951-56, in building up its position. This spending broke down like this: $245.6 million in production including exploration; $126.6 million in refining; $74.2 million in marketing; $30.1 million in transportation; and $8.1 million in other categories.

Montana Wildcat Comes In

BILLINGS, Mont. — Central Montana is apparently off to a significant exploratory year.

Texota Oil Co.'s 1 Goffena in Musselshell County is the first real Amsden news in Montana since Wolf Springs, the exploratory highlight of 1955 in the state.

Texota's well is the first discovery of 1957 on the Central Montana plains. It flowed 554 bbl. of oil daily on ¼-in. choke during first production test from perforations at 6,280-6,300 ft. The discovery is 6 miles southeast of Gage Dome field and 25 miles northwest of famed Wolf Springs-Amsden field in Yellowstone County. The 1 Goffena was drilled in an area which had not been tested.

Texota has interest in 1,920 acres in an 80-acre checkerboard around 1 Goffena and holds one-third of a section which was bought along with Amerada Petroleum Corp. and Mobil Producing Co. at the December Montana state sale. They paid a bonus of $68 an acre.

NPC Pipeline Study Asked

AUSTIN.—The National Petroleum Council has been asked by Texas Independent Producers and Royalty Owners Association to make a study of petroleum pipeline transportation facilities in the United States.

A. E. Herrmann of Amarillo, president of TIPRO, made the request in a letter to Walter S. Hallanan, NPC chairman. Herrmann cited a statement of Interior Secretary Fred A. Seaton as showing the need for an investigation. Seaton said that petroleum pipeline capacity in the U. S. is inadequate to handle increased emergency oil output of which the oil industry is capable.

Processing briefs

A 15,000-bbl. Ultraformer recently was placed on stream at Pure Oil Co.'s Smiths Bluff refinery at Nederlands, Tex. Capacity of the plant is 67,000 bbl. The new cat reformer was built by Ralph M. Parson Co., Los Angeles.

Gulf Oil Corp. will exercise its option to buy 280 acres near Charleston, S. C., one of six locations under consideration for a possible refinery site. Option is held on the other five tracts. Exact location of the refinery will depend on results of a study which the company is conducting.

A new petrochemical plant will be built by Du Pont's polychemicals department about 27 miles upstream from New Orleans. Option has been exercised on a 600-acre tract at La Place on the Mississippi River. The department manufactures plastic materials, industrial chemicals and intermediates used in making nylon. Specific products to be made at the new site were not announced.

Shell Oil Co. of Canada, Ltd., has placed a 6,600-bbl. Platforming unit on stream at its 45,000-bbl. Montreal-East refinery. The unit is the second Platformer installed by Shell in Canada. Last March, a 3,300-bbl. unit went in at the company's 18,000-bbl. plant at North Burnaby near Vancouver.

Capacity has been doubled at Carbide & Carbon Chemicals Co.'s ethylene diamine plant at Texas City. The company also reduced the price 4 cents, to 40 cents a pound in tank-car quantities. This petrochemical intermediate is used in the manufacture of textile resins, fungicides, sequestering agents, and polyamide resins.

Celanese Corp. of America will go on stream at its new 40-million-pound low-pressure polyethylene plant at Houston early in February.

Nearby, Phillips Chemical Co., licensor of the process, has already begun partial production at its own new polyolefin plant. The Phillips plant will have a 110-million-pound yearly capacity. Both plants are located in Phillips' new petrochemical center on the Houston Ship Channel near San Jacinto State Park.

Employes of Sohio Chemical Co., Lima, Ohio, have voted 67 to 41 to designate Oil, Chemical and Atomic Workers International Union as their bargaining agent. The vote set aside a local independent union which had held bargaining rights in the plant for the last year. The chemical firm is a subsidiary of Standard Oil Co. (Ohio).

Phillips Petroleum Co. has put a 16,000-bbl. Platformer on stream at its 55,000-bbl. Kansas City refinery. The unit was designed by Universal Oil Products Co. and installed by Procon, Inc., which has erected two other U.O.P. Platformers for Phillips.

The Texas Railroad Commission has approved Tuloma Gas Products Co.'s plan to convert a brine well in the Blue Ridge dome of Fort Bend County, Texas, to L.P.G. storage.

Also for Refiners . . .

The nation's butyl-rubber capacity will be increased one-third when Petroleum Chemicals completes a 30,000-ton plant planned at Lake Charles (P. 125) . . . The role of the electronic computer in the small refinery is graphically portrayed by the work a computer is doing for Champlin Oil & Refining at its 23,000-bbl. Enid, Okla., refinery (P. 126) . . . The L.P.G. industry needs at least two more months of cold weather to work off an inventory surplus (P. 127) . . . Richfield has bought a 1,000-acre refinery site near Everett, Wash., in the Puget Sound area (P. 128) . . . Du Pont's latest survey shows premium gasoline moved up 0.2 of an octane number in the last quarter of 1956 while regular jumped 0.5 (P. 136) . . . Four big companies—Socony Mobil, Royal Dutch-Shell, California Texas, and British Petroleum—have finally reached an agreement with the Turkish Government to build a 65,000-bbl. refinery in the country (P. 137).

PLUS THESE TECHNICAL FEATURES: Refiners broke all records last year and they are headed for more of the same in '57 (P. 168) . . . Production at natural gasoline plants will pass 800,000 bbl. daily this year (P. 170) . . . New building will continue to expand quality and quantity—and some new processes are on the way, too (P. 176) . . . Petrochemicals sets a big goal for '57 (P. 178) . . . Refiners' construction plans (P. 198) . . . Field processing plants (P. 202) . . . Petrochem plant construction (P. 205) . . . Cost-imating (P. 261) and . . . The Foreman's Page (P. 263).

OPTIMISTIC NOTE was sounded at the first annual meeting of the Association of Oilwell Servicing Contractors by retiring president Frank Pool (above) and others. Greater specialization in drilling and production will mean . . .

Busy Future for Service Rigs

FORT WORTH.—Producers will rely more and more on servicing contractors as drilling and producing operations become more specialized and complex.

This is the outlook presented at the first annual meeting of the new Association of Oilwell Servicing Contractors here January 18-19.

J. M. McLaughlin, Magnolia Petroleum Co., Dallas, said that producers "cannot efficiently maintain the necessary equipment and specialists for all required operations.

"They will rely more and more on service agencies which can supply the needed equipment and team specialists for specific operations."

But he warned that although servicing contractors face a big demand, oil companies are going to become much more cost conscious in all operations. This is because flush production of oil is largely history, he said.

Here's what the future holds, he said:

. . . **More 20,000-ft.** and deeper wells will be drilled.

. . . **20,000 psi. pressures** will be encountered in wells.

. . . **Bottom-hole temperatures** well over 400° F. will be encountered.

To perform efficiently under such conditions, drilling mud must be selected and maintained. Cements and cementing practices must be improved.

In addition:

. . . **Increased drilling offshore** will mean service and supply facilities must be adapted to accommodate these operations.

. . . **Secondary recovery** will be emphasized more in the future, calling for more effective well-completion methods to permit production from easily damaged marginal wells, and more effective well-stimulation methods for wells of lowered productivity.

He predicted that secondary recovery or pressure maintenance of some kind will be the rule in essentially all reservoirs.

Need for organization . . . Frank Pool, outgoing president, told the contractors that they have shown no foresight in waiting so long to form an association to work for their common interests.

Pool, president of Pool Well Servicing Co., San Angelo, Tex., said the members of the fledgling organization face problems which most other industry groups have either whipped or are tackling. He listed these as:

. . . **Constant turnover** of personnel. This reflects lack of a good personnel program. Pay rates sometimes are low, hours long, and safety programs nonexistent. In many cases, employes get no paid vacations.

. . . **Lack of good supervision.**

. . . **Lack of service records.**

. . . **No representation** in public hearings on insurance, taxes, wages and hours, and weight laws. Service contractors last year saw insurance rates go up 8.2 per cent while drilling contractors rates were going down 8.41 per cent. This has been the trend for several years.

. . . **Complete lack of public relations** program. Such a program would mean better acceptance by the public as well as better relations between contractors.

Pool indicated the association's potential growth by explaining there are 2,000 well-servicing contractors in the U. S., "operating 8,000 servicing rigs valued at $250,000,000. They do a gross business of more than $200,000,000 annually."

The service rigs must tend to most of the 550,000 producing wells in the nation. And the number of wells is growing. Last year more than 31,000 wells were placed on production. In addition, service rigs did a lot of work on dry holes.

Pool called for better and cheaper well service than an oil company can provide for itself.

He urged contractors not to hesitate in trying new equipment. It may seem too expensive at first glance, but that's because the contractor's economic ceiling is going up all the time.

The meeting attracted about 120 registrants from six states. Membership has grown from 25 last April to 100 contractors.

Record Tanker Set

106,500-ton vessel booked for construction in U. S.

QUINCY, Mass. — Stavros S. Niarchos will build a record-breaking 106,500-ton tanker. The huge ship, which will be built at Bethelehem Steel Co.'s yards here, is the world's largest tanker currently on order.

Niarchos made the announcement while attending the launching here of his 42,000-ton World Beauty, the largest tanker ever built in the United States.

The new 106,500-ton supertanker will have a length of 949 ft., a beam of 134 ft., and will draw 49 ft. She will have an 821,000-bbl. capacity. Her 43,000-hp. power plant will give her a speed of 18 knots. Delivery is scheduled for 1959.

The announcement of Niarchos' new 100,000-ton plus tanker brings to four the number in the 100,000-ton category now on the books. Two will be built for A. S. Onassis at Quincy and the other will be built by D. K. Ludwig in Kure, Japan.

The newly launched World Beauty is 737 ft. long and 102 ft. wide. She has a capacity of 400,000 bbl. and a draft of 37½ ft.

Court Sets Tidelands Hearings

WASHINGTON.—The U. S. Supreme Court will hear argument April 8 on the federal Government's request for an immediate decision on Louisiana's boundary.

The Justice Department has been pressing the court to decide the issue without further study of its merits. The state demands a full review of historical facts which it claims will answer the Government's challenge of its title to a 3-league boundary in the Gulf of Mexico.

If the court turns down the department's motion for quick action, the case will hang fire until next fall. The current term ends early in June, and briefs and answers could not be filed in time to get a hearing this spring.

The Interior Department, meantime, says that oil operations on the outer Continental Shelf off Louisiana have been "quickly" resumed under the agreement reached last October.

New activity . . . By the end of the year, 272 leases had been brought under terms of the agreement and 104 new drilling permits had been issued on them, Interior Secretary Fred A. Seaton said.

A total of 322 leases were affected by the Supreme Court's "stop" order last June 11. The order barred new leasing by both the state and federal Government and prevented new drilling starts in the disputed area except by mutual agreement of the contestants.

The agreement which followed split the disputed offshore area into four zones. The state is permitted to lease in the nearest zone and the federal Government in the outer.

No leases have been issued in the two intervening zones. No operations will be undertaken in the nearest of these until the boundary suit is decided. A year's moratorium was put on leasing activities in the other.

Stage Clearing for Gas Fight

WASHINGTON. — A congressional squabble over President Eisenhower's endorsement of natural-gas legislation has simmered down into a "wait-and-see" attitude.

The President's views, given in his annual budget message, brought charges from Democrats that it was not "strong" enough. But they did not say just how they thought it could be strengthened.

Republicans came back with assertions that Eisenhower had outlined a good basis for a bill.

There is still some bitterness over the President's veto of the Harris-Fulbright bill last February. Some members point out that the veto was based on objectionable methods used to gain support for the bill, and not because of any lack in the measure itself.

Some members believe that the veto last year will lose support for the bill this year. Others say Eisenhower's insistence on consumer protection will swing some votes behind any bill that carries out that demand.

Bills coming up . . . The President's support of repeal of federal control over independent gas producers has at any rate brought the issue to the fore. Bills meeting his specifications are expected to be laid before House and Senate committees, with early hearings being sought.

The first test will come in the House commerce committee. Two years ago the Harris bill squeezed through that group by a one-vote margin. Since then there has been a number of changes in the committee's make-up. The result, so far as it can be analyzed now, has not been to substantially increase support for the legislation.

The Harris bill didn't fare any better on the House floor than it did in committee. It was passed, but with a margin of only six votes. This year it may do better as the result of federal regulation, which could only be forecast in 1955.

Once past the House, a bill should have easy going. In the Senate, with less than one-fourth as many members, it was approved last year by a 15-vote margin in the face of "disclosures" of alleged attempts to buy support.

Industry observers say the President's support has taken care of the first of three "musts" necessary to get producer regulation repealed. The second is the backing of Democratic leaders. And the third is a purely factual presentation by the industry when committee hearings are held, without emotional appeal and with all the cards laid on the table.

Trans-Canada Financing Set

OTTAWA.—Financing of the $375,000,000 Trans-Canada pipeline now appears on solid ground. No further extension of time to prove financial ability is required, according to Canada's Trade Minister Howe. Deadline for final clearance is January 31.

Howe's announcement followed a meeting with N. E. Tanner, president of Trans-Canada, and C. S. Coates, general manager.

Here is how the financial situation stands now, according to Howe:

Major investors already have taken $124,000,000 in Trans-Canada bonds and the company will be ready to place common bonds and debentures totaling $112,500,000 on the open market in February. About $37,500,000 of this would be in common voting stock.

Sponsors of the company have received common stock in return for $15,000,000 put into the company.

Stanolind Renamed

Merged firm to be called Pan American Petroleum

TULSA.—Stanolind Oil & Gas Co. will change its name to Pan American Petroleum Corp. February 1. The action will follow merger of Stanolind and Pan American Production Co. late this month. Both are subsidiaries of Standard Oil Co. (Ind.).

Stanolind President E. F. Bullard announced the change is being made for two reasons:

. . . To eliminate confusion in public mind between Stanolind and other oil companies with similar names.

. . . To give the Tulsa-based firm a name more indicative of the geographical extent of its operations.

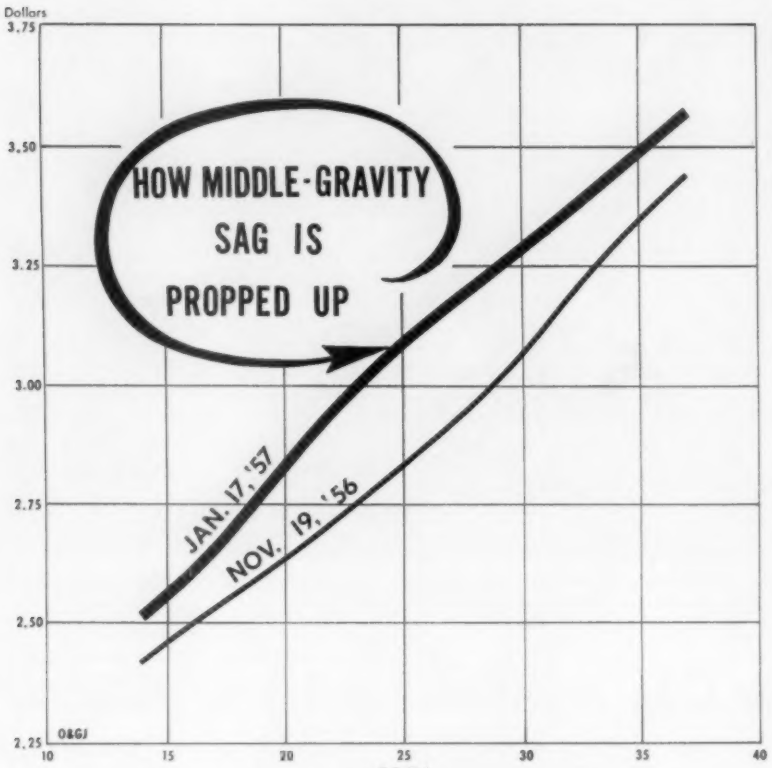
Bullard explained the "new name will indicate our expanding interest in petroleum exploration in the Western Hemisphere." In the past 15 months the company has extended exploratory efforts to Cuba, Jamaica, and Venezuela. It has been active in Canada for more than 9 years.

Bullard said the name change will not affect company employment practices, operating policies, benefit programs, or any other activities.

Stanolind is the chief oil and gas-producing subsidiary of Indiana Standard. In 26 years it has become the fourth-ranking U. S. producing company.

Indiana Standard announced several months ago it planned to consolidate nine of its subsidiaries into four companies. Other moves will merge American Oil Pipe Line Co. into Service Pipe Line Co. and Pan-Am Southern Corp. into American Oil Co.

The organization's three chemical companies, Indoil Chemical Co., Pan American Chemical Corp., and Hidalgo Chemical Co., already have been merged into a single company, Amoco Chemicals Corp.



NEW AND OLD postings on Signal Hill crude show how . . .

In California's new prices . . .

Middle Grades Pick Up Ground

LOS ANGELES.—The price position of California's middle-grade crudes was sharply improved in new schedules posted last week by major crude buyers on the coast.

That trend was started by Standard Oil Co. of California, Western Operations, Inc., which initiated the price increases. It is being followed by other purchasers.

The advance amounted to about 25 cents for 26°-28°-gravity crudes. But it tapered down to about 10 cents for heavy crudes and to 13 cents for light crudes *(The Oil and Gas Journal, January 21, page 62)*.

The result is a slight bulge in the middle of the gravity schedules instead of the sag that did exist. The sag had been created during recent years by the more rapid advance of prices for crudes on either end of the gravity scale.

The picture of what happened to Signal Hill crude in the last two California price increases is shown in the accompanying chart. In the last general advance in February 1953, light-crude prices remained unchanged. Those for lower gravities were raised about 12 cents. New schedules posted last November enlarged this sag in the middle of the scale. The 40-cent advance then for 14°-gravity crude tapered down to 15 cents for 28°-gravity and was even less in the lighter grades.

Standard's new postings counteracted this. Standard's lead was followed by Union Oil Co., General Petroleum Corp., and The Texas Co.

Standard explained the reason for the increase was the pressure brought about by the general raise in crude and product prices in other sections of the United States.

"We have to keep in line with U. S. and world prices if we are to continue to get needed supplementary supplies for this area and to keep our stocks from being sold away to more profitable markets," the announcement said.

Test Sets Panhandle Record

AMARILLO.—Magnolia Petroleum Co. may have the deepest producer in the Texas Panhandle at its 1 D. D. Feldman in Hemphill County.

The 15,997-ft. wildcat, located 10 miles east of Glazier in the northeast part of the county, has already established a drilling depth record in the Panhandle. Nearest production is 40 miles west of the site.

Production tests will be made in three zones where drill-stem tests indicated gas production. The zones are the Tonkawa-Penn at 7,562-7,608 ft., which tested 1,500 M.c.f. per day; Marmaton-Penn at 9,045-9,150 ft., which made 192 M.c.f.; and basal Pennsylvanian formation at 11,433-11,531 ft., which flowed 110 M.c.f.

Previous drilling depth record for the Panhandle was Gulf Oil Corp.'s 1 E. Porter-A in Lipscomb County, which was dry and abandoned in 1949 in the Ellenburger at 14,278 ft.

Humphrey's 1957 Depletion Comment: It's Doing the Job

WASHINGTON.—The 27½ per cent depletion allowance for oil and gas does what it was intended to do so it must be all right, according to Treasury Secretary George Humphrey.

Humphrey holds a news conference every January to explain the budget. Last year, he told reporters he felt the oil industry's depletion allowance was necessary, but didn't commit himself on the rate. This year he refused to say whether 27½ per cent was proper. But he did point out that reserves have just about kept pace with consumption.

"So it looks like this thing is working out properly," Humphrey said.

The secretary said that nobody could say whether 27½ per cent or a higher or lower figure is the "right" one. But if you have a figure that works out as it is intended to, that is the best you can do, he said.

And that, he added, is what he will tell Congress if it asks for his views—in practice 27½ per cent has worked out pretty well.

Hard Luck Hole Gets Casing

PECOS, Tex.—Gulf Oil Corp. has cemented a protection string of 5½-in. casing at 18,470 ft. in its hard luck test, the 1 P. G. Northrup, 24 miles southeast of here *(The Oil and Gas Journal, January 7, page 80)*.

The company set pipe prior to deepening the hole to contract depth of 19,200 ft.

Gulf has been drilling the 1 Northrup off and on since January 13, 1952. A heavy-duty rig has been on the project for about 840 days. In the 5 years since the hole was spudded, the well has been abandoned temporarily and reentered three times. The hole has

been sidetracked three times, too.

During its long career, the 1 Northrup has held the state drilling depth mark once and the Permian basin depth record on three separate occasions. It holds the latter record now, having reached 18,771 ft. late last year.

Automation Pushed

Entire products system to operate by remote controls

PORT ARTHUR, Tex.—Evangeline Products System's 16-in. line from here to Baton Rouge will be completely automatic when an expansion under way is completed.

The current expansion will also boost capacity of the line from 129,000 to 170,000 bbl. daily.

Also scheduled during the construction program is a new booster station at Port Barre, La.; an additional pumping unit at Lake Charles; a third pumping unit at Jennings, La.; and a new pumping unit and additional tankage at Port Arthur.

The Jennings station has been operating automatically since it was installed last summer. It and the Port Barre station will be identical. Each will have three 1,720-hp. Nordberg gas-diesel engines driving four-stage United Iron Works centrifugal pumps through Farrell-Birmingham gear increasers.

The Port Arthur and Lake Charles stations are equipped with electric motors as prime movers. When the expansion is completed, pumping horsepower of the line will total 17,220.

The Evangeline System is operated by Texas Pipe Line Co. Undivided-interest owners are Texas Pipe Line, Gulf Refining Co. (Pipeline Department), Sinclair Pipe Line Co., and Teche Pipe Line Co.

The line went into operation in September 1953 with an initial capacity of 96,000 bbl.

Famous Well Set for Toast

EDMONTON, Alta.—The well which sparked Alberta's vast oil development of recent years is going to have a birthday party.

Leading figures of Alberta's oil industry, along with provincial, federal, and civic government heads, will meet here February 13 to mark the tenth anniversary of 1 Leduc, brought in by Imperial Oil, Ltd.

By the time the anniversary date arrives, the well which opened Leduc-Woodbend field will have produced 215,380 bbl. of crude. Total field production will be approximately 142,797 bbl. There now are 1,255 wells in the field capable of producing.

Pipeline briefs

A 24-in. products pipeline is expected to be built from the Philadelphia refining area to Cleveland. Gulf Refining Co. and Sinclair Pipe Line Co. are considering the project, which would be operated by a new company—Laurel Pipeline Co. The route could parallel Sinclair's existing line. It is understood that stock will be split 50-50 if the two companies build the line. The Texas Co. may be brought into the deal.

Goliad Corp. is building a 37-mile, 6-in. products pipeline from its Kittie plant at Three Rivers, Tex., to Pettus, just south of San Antonio. Panama-Williams Corp., Houston, has the contract on the project. The line should be completed some time next week.

Trans Mountain Oil Pipe Line Co. has tested the first pumping unit of its new Jasper pump station in Alberta which will make possible increased throughput of the crude line from Edmonton to Washington. Deliveries increased from 157,856 bbl. daily in December to approximately 175,000 bbl. daily this month, and are expected to continue at that level during February.

Prices of large-diameter and line pipe were increased last week for the second time in 6 months. The increase, averaging 3.5 per cent, applied to 14-in. and larger pipe. Prices varied according to grade and wall thickness. For seamless and electric-weld plain-end trunk line pipe, 14 to 36-in., grades A and B, the increase was $7 per ton for 0.250 to under 0.312-in. wall, $6 per ton for 0.312 to under 0.375-in. wall, and $4 per ton for 0.375 and heavier wall pipe. The advance last August was $9.50 to $12 per ton and affected all sizes, coming as a result of the wage increase granted steelworkers *(The oil and Gas Journal, August 13, 1956, page 86).*

Texas Eastern Transmission Corp. plans to build 17 miles of 8-in. and 3 miles or 6-in. gas line from its 20-in. Baytown-Hankamer line to Alco-Mag field in Harris County, Texas. Texas Eastern will take natural gas from Alco-Mag and Aldine fields, where the net wellhead price will be 10.7 cents per thousand cubic feet. Cost of the facilities will be $857,000. Construction has been approved by a Federal Power Commission examiner, but is subject to commission review on appeal by parties to the proceedings.

The Federal Power Commission has 1,899 certificate applications on file from independent producers of natural gas. There were 99 applications filed and 109 certificates issued last month. Applications filed from June 7, 1954, when independent producers came under FPC jurisdiction, to December 31, 1956, the commission received 7,738 applications for permission to make gas sales.

Permian Oil Co., Midland, has bought a crude-oil gathering system in southern Wise and northern Parker counties in North Texas from Ashland Oil & Refining Co.

The 14½-mile system of 2 to 5-in. lines gathers about 6,000 bbl. of oil a month from 45 wells in the Daly, Springtown, and Peel areas. It delivers the oil to Texas Pipe Line Co. at the latter's Springtown pump station in northern Parker County. Purchase price was not disclosed.

Also for Pipeliners . . .

Shell and Standard of California apparently have won the tug of war to build the first crude line out of the Four Corners area. The two companies managed to sign up steel originally scheduled for the automobile industry and plan to start laying a 600-mile line to Los Angeles this year (P. 125) . . . The lack of pipeline connections and other pipeline problems were cited when Texas set its February allowable at a record high of 3,543,672 bbl. daily (P. 128) . . . Imperial's J. R. White cites the problem of building additional pipeline capacity to eastern Canada (P. 130) . . . TIPRO asked the NPC to make a study of the nation's petroleum pipeline facilities (P. 131) . . . Canada's Trade Minister Howe says Trans-Canada will be able to prove its financial ability by the January 31 deadline (P. 133) . . . Evangeline pipeline will be fully automatic and have a capacity of 170,000 bbl. daily when a current expansion is completed (P. 135).

PLUS THESE TECHNICAL FEATURES: Pipelining moves ahead at fast pace (P. 180) . . . After setting records in '56, pipeliners expect to do it again in '57—with 24,000 miles of new line (P. 195) . . . and Pipeline Patrol takes a look at Pelican Island line (P. 267).

Octanes Continue Their Upward Climb

PREMIUM gasoline moved up 0.2 of an octane number during the last quarter of 1956. Regular grade gained 0.5 of a number.

The weighted average of samples of premium gasoline from 53 areas was 97.0 octane with 26 areas having a average research octane number of more than 97. This select group totaled 27 cities if Dallas and Fort Worth are counted separately.

The weighted average for regular gasoline was 90 octane compared with 89.5 at the first of October.

Du Pont Results from Across the Nation

(Octane numbers are by research method, arithmetic averages by cities)

	PREMIUM				REGULAR			
	Octane number			TEL cont. cc./gal.	Octane number			TEL cont. cc./gal.
	Jan. 1956	Oct. 1956	Jan. 1957	Jan. 1957	Jan. 1956	Oct. 1956	Jan. 1957	Jan. 1957
Aberdeen	94.0	95.0	96.2	2.02	85.7	88.2	88.9	1.64
Albuquerque	...	95.7	96.1	2.30	...	85.1	86.2	1.62
Amarillo	96.7	96.1	96.3	2.09	87.4	87.3	88.4	1.75
Atlanta	96.8	97.8	97.6	2.28	89.5	89.2	89.6	1.96
Bakersfield	95.0	95.4	95.6	2.78	86.0	86.2	86.4	2.26
Baltimore	96.8	97.8	98.1	2.73	91.6	92.1	92.9	1.97
Boise	...	96.1	96.3	2.07	...	85.8	86.5	1.74
Boston	96.8	97.6	97.4	2.28	91.3	92.1	92.4	2.29
Calgary	90.9	92.6	92.8	2.57	84.3	85.6	86.3	2.32
Casper	92.4	94.2	94.1	1.92	85.2	86.3	86.3	1.26
Charlotte	96.8	97.5	97.7	2.22	89.4	88.9	89.7	2.04
Chicago	94.9	96.8	97.1	2.51	89.1	91.4	91.2	2.44
Cincinnati	95.2	97.2	98.3	2.57	9.02	91.3	91.6	2.04
Cleveland	95.3	96.9	97.9	2.61	90.8	91.7	92.1	1.96
Columbus	94.9	96.8	98.1	2.42	90.0	91.4	91.2	2.10
Corpus Christi	97.0	97.5	98.2	2.83	88.6	88.7	88.9	2.43
Dallas—Fort Worth	96.9	97.8	97.6	2.70	88.1	88.8	88.7	2.10
Davenport	94.0	95.6	95.3	2.42	82.6	88.4	89.2	1.97
Denver	91.8	93.8	93.7	1.92	85.3	85.6	86.2	1.60
Des Moines	93.8	95.7	95.3	2.22	86.9	88.0	88.2	2.05
Detroit	95.2	96.7	97.4	2.26	90.2	91.6	91.5	2.00
Edmonton	91.3	92.3	92.7	1.84	84.7	86.7	86.4	1.90
El Paso	95.5	96.0	95.6	1.75	86.0	85.8	86.1	1.75
Great Falls—Billings	94.1	94.5	94.5	1.52	86.8	87.0	87.5	1.64
Houston	97.4	98.0	98.1	2.59	88.7	89.6	89.4	1.78
Indianapolis	95.4	96.8	97.2	2.57	88.4	90.2	90.8	2.18
Jacksonville	97.1	97.6	97.3	2.41	90.5	90.8	91.2	2.11
Kansas City	94.2	95.8	96.1	2.13	86.7	88.4	88.8	1.86
Little Rock	97.5	97.3	97.6	2.44	89.0	88.9	89.2	2.02
Los Angeles	95.9	96.4	96.5	2.35	86.0	86.0	86.6	1.22
Louisville	96.7	97.4	97.7	2.60	89.6	89.7	89.9	2.14
Memphis	97.2	97.4	97.6	2.72	89.8	89.3	89.4	2.03
Milwaukee	95.3	97.0	97.3	2.56	89.4	91.2	91.2	2.39
Minneapolis	94.5	96.1	96.3	2.07	86.3	88.1	88.7	1.51
Montreal	94.8	96.8	96.0	2.10	89.5	91.1	91.4	1.40
Nashville	96.9	97.2	98.0	2.57	88.9	89.1	89.5	1.98
New Orleans	96.8	97.6	97.4	2.60	88.9	89.1	89.0	1.88
New York	96.8	97.7	97.8	2.38	91.9	91.9	92.6	2.02
Norfolk	...	...	97.8	2.34	...	...	92.3	2.46
Omaha	94.4	95.6	95.8	2.50	86.4	87.9	88.4	1.91
Philadelphia	96.8	97.3	97.4	2.33	91.6	91.8	92.5	2.19
Pittsburgh	96.8	97.4	97.6	2.18	91.8	92.2	92.6	2.34
St. Louis	94.7	95.8	95.8	2.49	86.9	88.1	89.7	2.14
Salt Lake City	92.5	93.6	94.0	1.75	82.2	83.1	83.1	1.75
San Francisco	96.1	96.7	96.8	2.23	87.0	87.0	87.2	1.43
Seattle	95.9	96.4	96.5	1.83	86.4	87.2	87.3	1.19
Shreveport	97.2	97.1	97.4	2.66	87.7	89.1	89.0	2.59
Spokane	96.0	96.3	96.4	1.86	86.3	87.3	87.2	1.03
Syracuse	...	...	97.9	2.33	...	...	92.4	2.25
Toronto	95.3	96.2	96.2	2.14	88.9	90.2	90.7	1.75
Tulsa—Oklahoma City	94.6	95.8	96.1	2.41	86.8	88.5	87.9	1.97
Vancouver	94.5	96.0	96.4	1.60	85.4	87.5	87.9	0.62
Wichita	93.9	95.9	95.7	2.51	86.3	88.0	88.1	2.20
Winnipeg	92.5	95.7	...	...	86.5	88.7	...	...

SHIFTS IN OCTANE RATINGS
(Cities per octane group)

Premium

Octane group—	Jan. 1955	Jan. 1956	Oct. 1956	Jan. 1957
98 Research and over	...	...	1	6
97-97.9	...	6	18	20
96-96.9	...	14	16	14
95-95.9	9	10	11	7
94-94.9	13	12	2	3
93-93.9	6	2	2	1
92-92.9	11	3	2	2
Below 92	9	3	...	...
Total tested	48	50	52	53

Regular

92 Research and over	...	...	3	8
91-91.9	...	5	9	7
90-90.9	3	5	3	2
89-89.9	5	8	7	11
88-88.9	2	7	13	9
87-87.9	6	3	7	6
86-86.9	7	14	4	9
Below 86	25	8	6	1
Total tested	48	50	52	53

A year ago, the national averages were 95.9 octane for premium and 88.2 for regular. The figures are from the quarterly Du Pont survey.

The city with the highest rated premium was Cincinnati where samples from nine stations averaged 98.3 octane. Baltimore took top place for regular on a city-wide basis with an average of 92.9.

The small table shows the trend toward higher octane numbers over the past 2 years. The survey for January 1955 carried no city with a premium average as high as 96 octane. The latest survey shows 40 cities out of a total of 53 with averages of 96 or better. Two years ago, 25 cities were getting regular gasoline that tested below 86 octane. Only one city remained in that group at the time of the lastest survey.

Bureau Wants More Money

WASHINGTON.—The Bureau of Mines hopes Congress will increase its budget so it can give the oil industry more and better facts.

Given an increase that averages out at $1,000 a week, the bureau would get better production figures on areas and states, officials say. It would also do more detailed reports on refinery output and distribution of products.

The increased fund would take off the pressure which a few months ago had bureau officials fearing they would have to drop the weekly crude stock report.

Gulf Leaves Italy

● American firm abandons promising program because of Italian oil law, plans to continue work in Sicily

GULF OIL CORP. last week made good its threat of 4 months ago. The American major's Italian affiliate is bowing out of Italy's oil play entirely.

In a joint announcement made in Rome by Avv. Nicolo Pignatelli Aragona, general manager of Gulf Italia, and in London by G. W. Hamilton, board chairman of Gulf Eastern Co., the company made its position official.

Gulf has decided it wants no part of the new Italian oil legislation, which is designed to give the Italian Government the lion's share of any profit from oil production. The law is so designed the government gets the big "half" in a series of graduated royalties on production, plus a number of local and national taxes which Gulf regards as discriminatory.

The official statement said that Gulf is making the move reluctantly. The company warned last September that if the law passed in its final form that it would have no choice except to drop its exploration effort on the Italian mainland.

"Gulf regrets such a decision, but in view of the economically unattractive features of the hydrocarbons bill recently passed by the Italian parliament and now in the course of promulgation, it has no alternative," the statement said.

Staying in Sicily . . . Gulf pointedly made it clear that its decision has no effect on its operations in Sicily.

Gulf said it will continue to develop Ragusa field in Sicily. Ironically, Gulf's announcement came just a few days before the company was ready to put a pipeline into operation which will put the Sicilian field on full production.

Gulf said its activities in Sicily will "go forward at an accelerated rate." Sicily's regional oil law of 1950 is much more liberal toward private enterprise than the recently enacted oil law on the Italian mainland *(The Oil and Gas Journal, January 21, page 76)*.

Gulf said that its production at Ragusa, the only commercial oil field so far discovered in Sicily, is now about 18,000 bbl. daily. It is expected to be stepped up sharply as soon as the 35-mile pipeline linking the field with the RASIOM refinery at Augusta goes into operation this week.

The Cigno discovery . . . The Gulf company not only can be credited with Sicily's only commercial oil production, but it can lay claim also to the Italian mainland's most significant oil discovery—and by the same token its most frustrating discovery.

Petrosud, S.A., a 50-50 partnership between Gulf Italia and Montecatini, S.P.A., Italy's major chemical manufacturer, made a major discovery on the east coast of the Italian mainland near Alanno in September 1955.

Petrosud's first well, Cigno 1, tested 2,000 bbl. daily of 34°-gravity oil at 2,300 ft. The second test, a 1,700-ft. offset, was completed as just as good a well.

Petrosud was never allowed to produce the two wells. The Italian Government, yielding to socialist pressures which have always advocated nationalism of the country's industry, refused to give the company a development concession after the discovery was made.

Gulf said it has made arrangements to turn over all its interests in Petrosud to Montecatini. This not only holds true for the Abruzzi area of Italy where the Cigno discovery was made, but to all other sections of the Italian mainland as well.

Paris Basin Search Opens

The first well in a French-American oil exploration program covering 7,722 sq. miles of the Paris basin has been spudded near Senelly, about 25 miles southeast of Orleans.

A joint operation of American Overseas Petroleum (France), a Caltex subsidiary, and Societe Nationale des Petroles du Languedoc Mediterranean (S.N.P.L.M.), the first test will probably be drilled to 8,000 ft. The operation will be under the control of Cie. Exploration Petroles, a jointly owned company organized to carry on the work.

The American and French companies were granted a 5-year exploration permit more than a year ago and have been conducting seismic work over the area since that time.

Option Is Acquired

Shell sells half interest in Venezuelan concessions

S.A.P. LAS MERCEDES has obtained an option to acquire 50 per cent interest in concessions of Cia. Shell de Venezuela in Anzoategui and Guarico states.

Mercedes will have to pay drilling and other costs over a 3-year period under the conditions of the option. About 500,000 acres are involved.

In nearby Monagas, the company has half interest in the Oritupano area, where one of Eastern Venezuela's more important development programs is under way. Development drilling is concentrated on a new trend found a year ago in the southwest part of the 100,000-acre pooled area.

About a dozen wells have been drilled and output has risen to 3,000 bbl. daily, compared with 500 bbl. daily 6 months ago. Output is limited by lack of a pipeline outlet.

Venezuelan Atlantic Refining Co., which holds the other half interest in the acreage, is the operator. Mercedes is owned jointly by The Texas Co. and Ultramar Co., Ltd., through Carasas Petroleum, S. A.

Turkish Plant Set

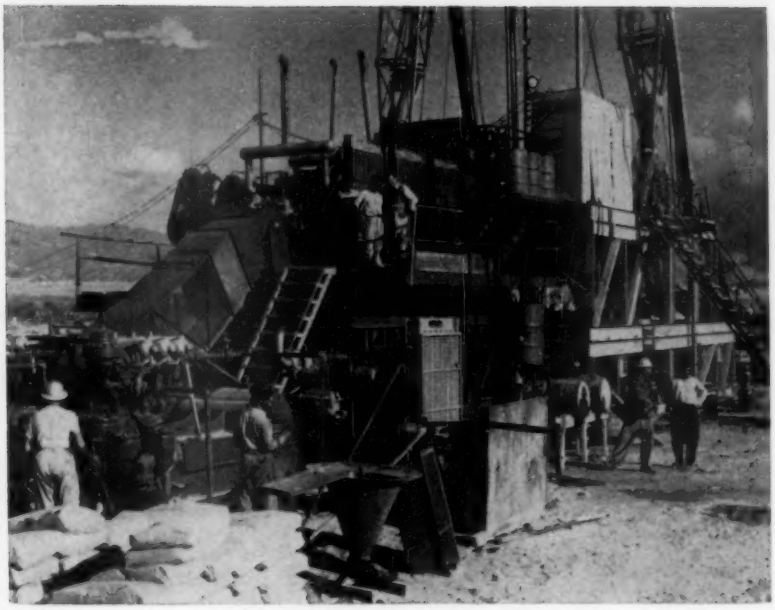
Agreement clears way for new 65,000-bbl. refinery

FOUR of the world's major oil companies have reached an agreement with the Turkish Government to build a 65,000-bbl. daily refinery in Turkey.

Talks, which have been going on for months, have settled the major points of the negotiation. Some minor revisions must now be made in Turkish laws to allow the project to move forward. Spokesmen for the four companies believe these revisions will be made by the Turkish legislative body.

The four companies, Socony Mobil Oil Co., Royal Dutch-Shell, California Texas Oil Co. (Standard Oil Co. of California and The Texas Co.), and British Petroleum Co., Ltd., will participate in the venture.

The principal items yet to be ironed out are apparently provisions in the Turkish law which will allow the group to process foreign crude until Turkish crude is available for the refinery. All four have Middle East crude interests which could supply the refinery.



Turk Inaugural Well Tests Sea

TURKISH AMERICAN OIL CO., Iskenderun, is drilling below 5,900 ft. on 1 Iskenderun, the first test on concessions granted under Turkey's new oil law.

The hole, being drilled on a farmout from Gilliland Oil Co. of Los Angeles, is exploring an anticline which extends from Iskenderun Gulf out under the Mediterranean Sea. The wildcat is being slant-drilled under the sea from an onshore site. It is scheduled to test a porous limestone interval at an estimated 7,000 ft.

Another rig is on its way to Turkey to drill a wildcat in the Cizre area 10 miles from the Iraq border and 3 miles from the Syrian border. Location is on a farmout to Turkish American, on a 125,000-acre Gilliland concession.

Iraq's huge Kirkuk oil field is 75 miles east of Gilliland's Cizre concession. Drilling & Exploration Co. is the drilling contractor on both tests.

Pakistan Drilling Stepped Up

PAKISTAN PETROLEUM, LTD., is following up its recent successes in Pakistan with an exploration program this year that will consume a big share of its $6,500,000 budget.

The company will drill two deep wildcats, complete three now drilling, and drill the first development well at its new Sylhet gas field.

One of the wildcats will be drilled at Bannh, West Pakistan, 50 miles southwest of Sibi. The location is in the central part of the country, where P.P.L. discovered one of the world's largest gas fields at Sui in 1953. But the site is northwest of the gas field.

The other deep test will be drilled at Lalmai, near Comilla, which is a short distance near the Burmese border in East Pakistan.

The three wildcats now under way all are located in the country's western wing. The Karachi test is drilling ahead at 7,555 ft., Khairpur test at 8,622 ft.

A wildcat at Adhi, near the country's only producing fields, is drilling ahead at 1,000 ft. The well is a retest of a structure which had a noncommercial show at 7,700 ft. 5 years ago 13 miles from the present site. The test is a point venture with Pakistan Oilfields, Ltd.

Push gas development . . . P.P.L., a Burmah Oil Co., Ltd., subsidiary, is rigging up this month for the first development well on Sylhet structure in northeast East Pakistan. Two wells have been drilled in the field.

A preliminary survey already has been completed for a 145-mile pipeline to Dacca, a city of 400,000.

Meanwhile, the market continues to grow for Sui gas in West Pakistan. Gas currently used in Karachi has replaced 2,300 bbl. daily in fuel oil. A 217-mile, 16-in. line to Multan, in southern Punjab, is under construction.

World briefs

Construction of a huge pipeline from Iraq to Kuwait is projected by the Kuwait Government. But it is scheduled to carry water—not oil—from the Shatt-al-Arab River in Iraq to arid Kuwait, more prolifically endowed with oil than water. The line would have a capacity of 50 to 100 million gallons per day. A Kuwait firm is looking for a U. S. partner to bid on the project.

A new 14,500-bbl. Hydrofiner will be installed at Creole Petroleum Corp.'s Amuay Bay refinery in northwestern Venezuela. Construction by Foster Wheeler Corp. will begin in April, with completion expected in February 1958.

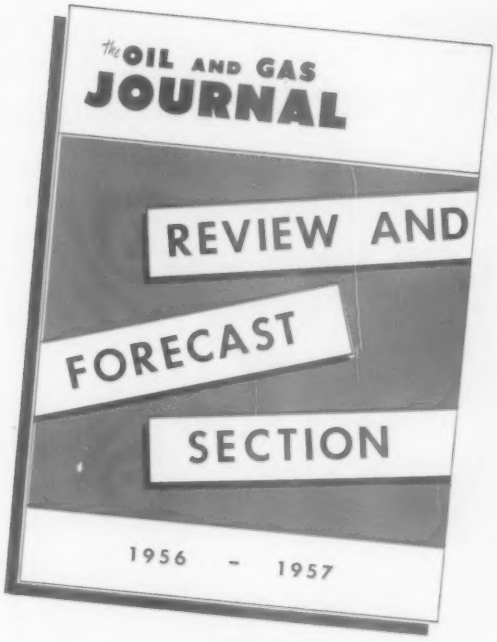
Shell-B.P. Petroleum Development Co. of Nigeria has found oil in its second step-out to a discovery west of Port Harcourt. The well is ¾-mile northeast of 1 Oloibiri, which encountered the country's first good show of free oil last year. The first step-out, ¾-mile northwest of the discovery, also was successful. A third step-out is expected to be completed in March.

Esso Standard Refinery S.A. is adding a 5,600-bbl. Powerformer, a 6,900-bbl. Hydrofiner, and offsite facilities at its Antwerp, Belgium, refinery. A $6,000,000 contract for engineering, designing, and constructing the units was let to Badger-Comprimo N.V. of The Hague. The company is the newly formed subsidiary of Badger Manufacturing Co. of Cambridge, Mass., and Comprimo, N.V. of Amsterdam. Completion is scheduled for early in 1958.

Price of Boscan crude has been boosted 5 cents a barrel by Richmond Exploration Co., a subsidiary of Standard Oil Co. of California. The boost puts the price of Boscan at $1.90 a barrel f.o.b. deep water loading terminal at Bajo Grande, Venezuela. Boscan is a 10°-gravity crude widely used for asphalt manufacture.

Cia. Shell de Venezuela brought its prices into line with other companies in the United States, Canada, and Venezuela, by boosting posted prices of 18 crude oils last week. Shell was the last of the major oil producers to do so in Venezuela. The increases range from 5 to 30 cents.

Russia has completed the first of two major underwater pipeline projects serving offshore Caspian oil fields near Baku. A new 3.5-mile-long line from Artyom Island to Apsheron will free Soviet tankers for other work. Construction has begun on a line running 12.5 miles from the Neftyaniye Kamny oil fields to Zhiloy Island.



THE BEST YEAR YET . . .

That's the Journal's unqualified prediction for the oil industry for 1957. In the brief paragraphs below, and in the 90 pages which follow, the editorial staff supports this prediction with some amazing figures, and some discerning analyses.

The reader interested only in the over-all picture will find some changes in presentation which enable a quicker comprehension, while the reader interested in detailed figures will find them as usual.

Drilling

DRILLING for oil and gas will set new records in 1957. The steel shortage held total completions to 58,160 wells in 1956 and may be the limiting factor in 1957. The forecast, calling for 60,056 wells and 242,796,000 ft. of hole this year, is believed to be conservative. Many operators completed their forecast questionnaires before the crude price increase. The largest percentage gain in 1956 was in gas-well completions as suppliers drilled up promising areas to supply gas for new pipelines. The trend toward increased wildcat drilling will continue in 1957 with a slightly larger percentage of the over-all drilling budget scheduled for exploration. Drillers set new depth records in nine states in 1956 and will go deeper in many areas during 1957. Drilling and production programs will call for capital expenditures of $3,600,000,000.

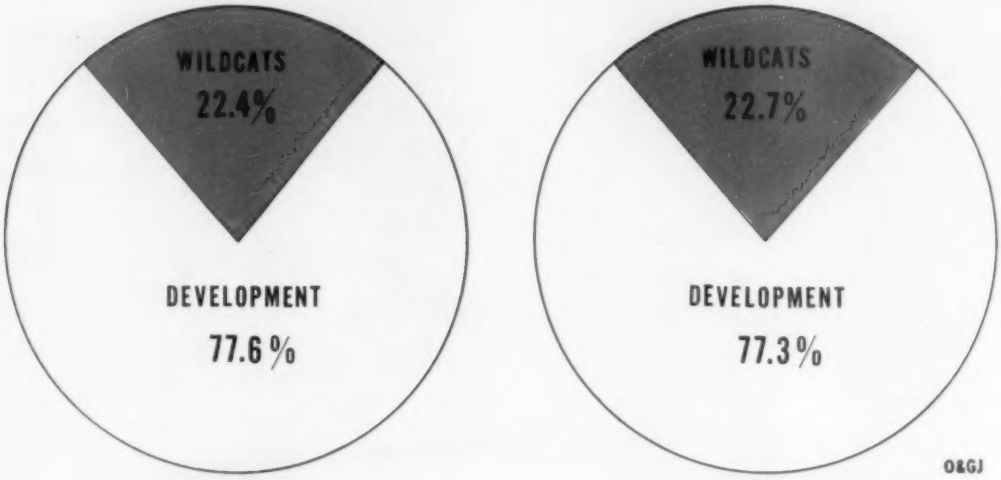
Production—Reserves

CRUDE PRODUCTION passed the 2.5-billion-barrel mark in 1956 and will climb to 2.76 billion in 1957. All of the important producing states except California and Oklahoma set new production records in 1956. Production gains in 1957, scheduled at 5.8 per cent, will bring a whole new set of records. Marketed production of natural gas gained 9.3 per cent in 1956 to 10.3 trillion cubic feet. Despite this record withdrawal rate, gas reserves increased 7.9 trillion cubic feet to 223.7 trillion. Year-end reserves furnish a firm base for increased production in 1957. Drillers found enough crude in 1956 to offset production and increase proved recoverable reserves by 1,187 million barrels. Reserves of natural-gas liquids gained 256 million barrels in 1956.

Processing—Markets

PETROLEUM REFINERS did their job too well in 1956. They produced more and better products. In fact, product output was too large, particularly gasoline. Crude runs averaged 7,934,000 bbl. daily in 1956, but an increase of at least 3.0 per cent will be needed to supply demand in 1957. Because of the Suez crisis, exports will increase and imports decrease in 1957. Production at natural-gasoline and cycling plants will move up 7.9 per cent in 1957, following the huge increase of 14.2 per cent in 1956. Refiners will meet the problem of upgrading products, particularly gasoline, with increased use of alkylation, cat reforming, hydrogen treating, and perhaps isomerization. Petrochemical production topped 34 billion pounds in 1956 and will rise further.

Wildcat percentage still inching up, as . . .



1956 1957

Operators head toward 60,000+ wells

OIL and gas operators will drill better than 60,000 wells this year, according to returns in The Oil and Gas Journal's annual survey.

Among the factors which indicate that the forecast of 60,057 wells is conservative are:

. . . Several good strikes early in the year would call for development drilling that may not have been included in this year's budget.

. . . Wildcat successes in the first quarter will promote exploratory drilling in the general area of the successful well with plenty of time for completion during the year.

. . . The most important factor is the fact that many of the questionnaires were completed before the increase in the price of crude.

Adjustments can be made for the first two conditions on a basis of past experience, but the tendency is for the forecaster to stick pretty close to what the operators say they have planned.

The last factor is applicable to this year only. The questionnaires were mailed out to hundreds of operators early in December, to be returned as soon as information on 1956 completions was available.

Many operators reported drilling programs that were compiled before buyers raised the price of crude soon after the start of the new year. Actual drilling budgets of larger companies may not be revised upward just because of the price increase. However, operating departments may find it a little easier to get extra funds later in the year if something really good breaks.

The large gains from the price increase will be in areas where much of the drilling is done by the smaller operators. The amount of drilling done by a small company or by an independent producer will depend on the decisions of one man or at least a small group of men. In many cases the amount of drilling will depend on the amount of money from the sale of crude.

Over a period of time, total drilling done in this country will vary directly with the value of crude and gas produced, expressed in dollars adjusted for inflation.

High export demands for crude in the first and second quarters of the year plus continuing gains in domestic demand will push 1957 crude production above the 1956 average by at least 5.8 per cent.

Crude Price Averaged $2.79

Crude for the country as a whole averaged near $2.79 a barrel in 1956. The crude-price increase early in 1957 boosted most inland crudes by $0.25 a barrel. Some crudes in Texas were up $0.35, and Louisiana coastal crudes advanced $0.40. Even with no increase in California, it is estimated that the average for the country is up about $0.23 a barrel. Based on a price average of $2.79 for all crude last year, new schedules, announced in the first week of the year, lifted the average crude price by about 8 per cent.

However, part of the gain from the crude-price increase may be lost before the end of the year through further inflation. In fact, wholesale prices of all commodities climbed about 5.4 per cent between the price

Large vs. "all other" operators

	30 large operators	All other operators	Total
Total wells drilled	13,518	44,642	58,160
Per cent of total wells	23.2	76.8	100.0
Total wildcats drilled	2,243	10,791	13,034
Per cent of total wildcats	17.2	82.8	100.0
Ratio of wildcats to total, per cent	16.6	24.2	22.4
Total field wells drilled	11,275	33,851	45,126
Per cent of field wells	25.0	75.0	100.0

increase in 1953 and the latest raise. Specific drilling and production costs were above the all-commodities trend enough that the latest increase did not cover all of the additions to cost since the price increase in 1953.

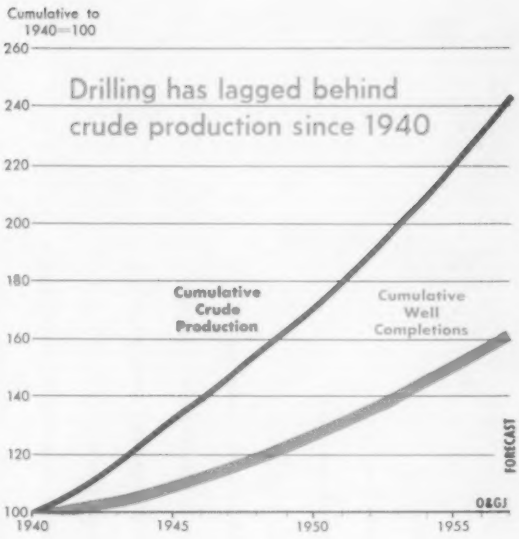
The forecast for 1957 shows only a small relative gain in wildcat drilling compared with total completions. For the year 1956, wildcats represented 22.4 per cent of all drilling and this ratio is raised to 22.7 per cent for 1957. There are at least two conditions that tend to prevent a larger relative increase.

There are definite indications of increased drilling in offshore areas for the coming year. Since drilling costs for these offshore wells are higher, the number of completions will be smaller.

Also, discoveries were good in some areas last year, and operators had done very little development drilling at some of the important strikes.

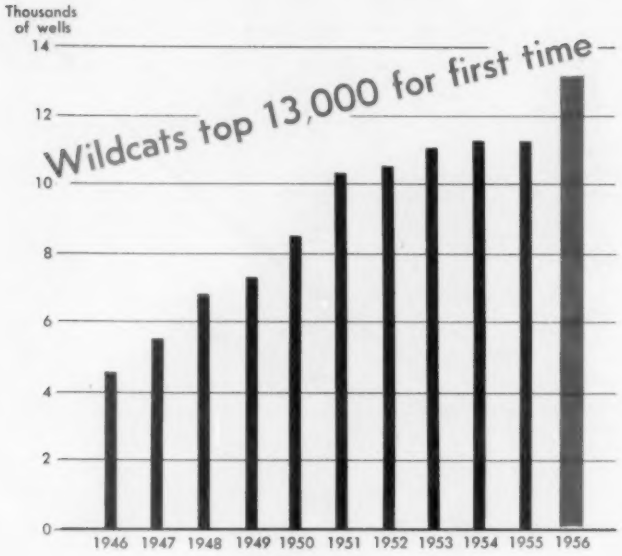
Replies from Canadian operators show planned drilling for 1957 to be about 3,330 wells.

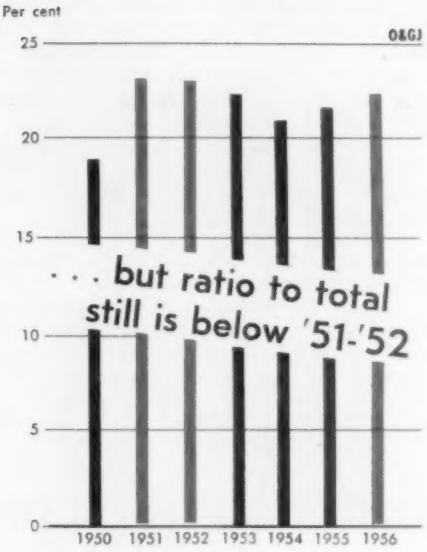
Canadian wildcat drilling is scheduled to be up about 8.5 per cent with development completions about on a par with 1956. Wildcat drilling for 1956 was actually less than in 1955 but development work gained 407 wells or 19 per cent over 1955.



13,467 wildcats, 46,410 field wells, nearly 9 million feet

	1957 forecast				Change from 1956 actual			
	Wildcat wells	Field wells	Total wells	Total footage	Wildcat wells	Field wells	Total wells	Total footage
Alabama	30	68	98	875,000	...	7	7	75,000
Arkansas	178	707	885	2,659,000	—12	—105	—117	—346,000
California	580	1,893	2,473	11,322,000	53	114	167	756,000
Colorado	682	580	1,262	6,419,000	7	33	40	187,000
Florida	13	...	13	87,000	...	...	...	— 4,000
Illinois	816	3,130	3,946	9,101,000	44	94	138	330,000
Indiana	178	631	809	1,356,000	33	35	68	113,000
Kansas	1,180	3,850	5,030	17,449,000	107	— 18	89	346,000
Kentucky	465	1,533	1,998	2,832,000	25	37	62	84,000
Louisiana	**802**	**3,467**	**4,269**	**31,316,000**	**24**	**370**	**394**	**2,878,000**
North	296	1,509	1,805	6,324,000	31	72	103	241,000
South	506	1,958	2,464	24,992,000	— 7	298	291	2,637,000
Michigan	152	282	434	1,249,000	—16	13	— 3	— 13,000
Mississippi	253	226	479	3,468,000	33	5	38	275,000
Montana	200	323	523	2,582,000	5	23	28	142,000
Nebraska	473	448	921	5,208,000	22	— 19	3	7,000
Nevada	10	...	10	64,000	7	...	3	39,000
New Mexico	306	1,620	1,926	8,599,000	28	— 6	26	141,000
New York	8	500	508	725,000	— 9	5	— 4	— 25,000
North Dakota	106	160	266	1,914,000	28	— 25	3	— 63,000
Ohio	25	1,050	1,075	2,574,000	12	— 23	— 11	— 9,000
Oklahoma	948	7,325	8,273	28,878,000	81	136	217	1,057,000
Pennsylvania	23	825	848	2,015,000	4	96	100	193,000
South Dakota	15	...	15	70,000	6	...	6	22,000
Texas	**5,734**	**16,339**	**22,073**	**94,857,000**	**124**	**430**	**554**	**2,237,000**
Dists. 1 and 4	1,020	2,155	3,175	12,367,000	—76	173	97	143,000
Dists. 2 and 3	914	1,775	2,689	17,912,000	44	20	64	460,000
Dists. 5 and 6	473	695	1,168	5,854,000	42	— 7	35	172,000
Dists. 7-B and 9	2,255	5,490	7,745	23,696,000	65	26	91	300,000
Dists. 7-C and 8	976	4,865	5,841	29,451,000	78	56	134	787,000
Dist. 10	96	1,359	1,455	5,577,000	—29	162	133	375,000
Utah	98	125	223	1,091,000	12	70	82	401,000
Washington-Oregon	5	...	5	35,000	— 2	...	— 2	— 14,000
West Virginia	28	678	706	1,904,000	1	12	13	37,000
Wyoming	310	625	935	3,997,000	21	— 16	5	31,000
Miscellaneous	29	25	54	150,000	—25	16	— 9	17,000
Total United States	**13,647**	**46,410**	**60,057**	**242,796,000**	**613**	**1,284**	**1,897**	**8,894,000**
Western Canada	**800**	**2,530**	**3,330**	**15,782,000**	**63**	**6**	**69**	**343,000**





New record for exploratory wells

EXPLORATORY drilling in 1956 rose to new record heights with the industry recording 13,034 wildcat completions, up about 5 per cent over the previous year's high.

Wildcat completions accounted for about 22 per cent of all wells finaled, up over the previous year when the ratio of wildcat drilling to total wells drilled was 21.6 per cent. In 1954 the ratio was 20.9 per cent.

. . . **New fields.** Total new oil fields opened, older ones extended, or new-pay zones in existing fields in 1956 was 1,613. Wildcat drills uncovered 469 new gas fields, compared with 353 in 1955. The year 1956 may be called a "gas year," both in wildcat completions and field-well completions. The opening of new gas provinces, stepped-up campaigns in the San Juan basin and Hugoton Embayment provinces stirred by demand and new pipeline outlets is the main factor in this healthy increase. The ever-present dry wildcat holes made their usual mark in 1956 . . . the total was 10,952.

. . . **Footage.** The industry set a record-breaking exploratory footage aggregate in 1956. Wildcatters dug more than 62 million feet of hole compared to about 59 million in 1955 and 54½ million in 1954.

. . . **Average wildcat depth.** The average depth of wildcat wells drilled in 1956 was 4,759 ft. compared to 4,804 ft. in 1955; 4,831 ft. in 1954; 4,714 ft. in 1953; and 4,511 ft. in 1952.

. . . **Success ratio.** The success ratio of all wildcats drilled in 1956 was 12.4 per cent oil, 3.6 per cent gas, and 84.0 per cent dry holes. This is a marked increase in the gas success ratio, and a decline in the oil success ratio. The dry-hole ratio is the highest in the past 6 years.

Louisiana and New Mexico had the highest success ratio of all wildcat states. The oil success ratio in the Pelican State was 21.6 per cent; the gas score was 8.1 per cent. New Mexico's success ratio for oil discoveries was 20.1 and 3.6 for gas. Other top honors went to Oklahoma with 17.8 per cent oil success ratio, Arkansas with 17.4, and Texas with 13.6. The country's most successful oil provinces continued to be South Louisiana, the Hugoton Embayment, Four Corners, and southern Oklahoma.

U. S. wildcatting results in '56

	Total wildcats	Per cent Oil	Per cent Gas	Per cent Dry
Texas	5,610	13.6	3.7	82.7
Oklahoma	867	17.8	4.7	77.5
Kansas	1,073	12.0	4.4	83.6
Illinois	772	6.6	0.6	92.8
Colorado	675	3.8	3.0	93.2
California	527	9.3	1.7	89.0
Louisiana	778	21.6	8.1	70.3
Wyoming	289	6.2	4.2	89.6
New Mexico	278	20.1	3.6	76.3
Nebraska	451	8.4	0.2	91.4
Kentucky	440	9.8	0.2	90.0
Indiana	145	11.0	0.7	88.3
Arkansas	190	17.4	4.2	78.4
Michigan	168	6.0	1.2	92.8
Utah	86	12.8	5.8	81.4
Others	685	12.6	6.3	81.1
Total 1956	**13,034**	**12.4**	**3.6**	**84.0**
Total 1955	12,271	14.8	2.9	82.3
Total 1954	11,280	14.2	3.5	82.3
Total 1953	11,062	14.2	3.3	82.5
Total 1952	10,552	14.1	2.5	83.4

Wildcats finaled in 1956

	Comp.	Oil	Gas	Dry	Footage (thou. ft.)
Alabama	30	0	1	29	146
Arizona	2	0	1	1	12
Arkansas	190	33	8	149	710
California	527	49	9	469	2,717
Colorado	675	26	20	629	3,368
Florida	13	0	0	13	91
Georgia	8	0	0	8	27
Idaho	4	0	0	4	16
Illinois	772	51	5	716	1,606
Indiana	145	16	1	128	229
Kansas	1,073	129	47	897	4,186
Kentucky	440	43	1	396	589
Louisiana	778	168	63	547	7,384
North	265	37	3	225	1,407
South	434	107	43	284	5,033
Offshore	79	24	17	38	944
Michigan	168	10	2	156	476
Mississippi	220	19	1	200	1,596
Missouri	34	4	0	30	26
Montana	195	12	1	182	892
Nebraska	451	38	1	412	2,442
East	24	0	0	24	74
West	427	38	1	388	2,368
Nevada	3	0	0	3	25
New Mexico	278	56	10	212	1,520
Northwest	106	14	8	84	441
Southeast	172	42	2	128	1,079
New York	17	0	4	13	62
North Dakota	78	8	0	70	431
Ohio	13	2	5	6	50
Oklahoma	867	154	41	672	3,936
Oregon	5	0	0	5	32
Pennsylvania	19	0	11	8	132
South Dakota	9	0	0	9	48
Tennessee	6	0	0	6	14
Texas	5,610	766	205	4,639	27,405
Dist. 1	498	39	12	447	1,564
Dist. 2	308	28	29	251	1,879
Dist. 3	562	53	51	458	4,547
Dist. 4	598	89	56	453	3,375
East	431	20	8	403	2,129
Dist. 7-B	1,075	147	4	924	3,748
West	898	180	14	704	5,486
North	1,115	181	8	926	3,803
Panhandle	125	29	23	73	874
Utah	86	11	5	70	408
Washington	2	0	0	2	17
West Virginia	27	0	15	12	120
Wyoming	289	18	12	259	1,314
Total 1956	**13,034**	**1,613**	**469**	**10,952**	**62,027**
Total 1955	12,271	1,812	353	10,106	58,958

...And field wells completed

	Comp.	Oil	Gas	Dry	Footage (thou. ft.)
Alabama	61	56	0	5	653
Arkansas	812	624	5	183	2,293
California	1,779	1,631	42	106	7,847
Colorado	547	225	87	235	2,864
Illinois	3,036	1,623	58	1,355	7,165
Indiana	596	272	6	318	1,015
Kansas	3,868	2,111	334	1,423	12,917
Kentucky	1,496	752	164	580	2,159
Louisiana	3,097	1,914	338	845	21,054
North	1,437	948	158	331	4,675
South	1,313	748	152	413	13,200
Offshore	347	218	28	101	3,179
Maryland	3	0	2	1	13
Michigan	269	192	10	67	787
Mississippi	221	126	4	91	1,597
Montana	300	222	6	72	1,549
Nebraska	467	263	0	204	2,759
East	11	2	0	9	34
West	456	261	0	195	2,725
New Mexico	1,626	805	664	157	6,939
Northwest	744	72	622	50	2,833
Southeast	882	733	42	107	4,106
New York	495	222	10	263	689
North Dakota	185	156	0	29	1,546
Ohio	1,073	570	173	330	2,533
Oklahoma	7,189	4,671	280	2,238	23,885
Pennsylvania	729	260	225	244	1,690
Tennessee	1	1	0	0	1
Texas	15,909	12,316	689	2,904	65,214
Dist. 1	1,105	928	7	170	2,828
Dist. 2	469	254	106	109	2,885
Dist. 3	1,286	884	99	303	8,139
Dist. 4	877	492	161	224	4,456
East	702	465	74	163	3,553
Dist. 7-B	2,010	1,507	9	494	6,581
West	4,809	4,545	29	235	23,178
Dist. 9	3,454	2,297	31	1,126	9,265
Dist. 10	1,197	944	173	80	4,329
Utah	55	30	13	12	282
Virginia	5	0	5	0	24
West Virginia	666	73	491	102	1,747
Wyoming	641	430	40	171	2,653
Total 1956	**45,126**	**29,545**	**3,646**	**11,935**	**171,875**
Total 1955	44,411	29,755	3,260	11,396	167,312

In Texas . . . Texans retained their accustomed lead in wildcat drilling, coming up with the lion's share of the nation's wildcats . . . 5,610 exploratory wells; wildcat footage hit 27,405,000 ft.

Wildcatting waxed and waned in the various districts of Texas during the year. At the year's beginning drilling was brisk in Southwest Texas, but quieted down later in the year. Wildcat activity along the Gulf Coast steamed along at a stable rate during the year. Exploration in the Panhandle counties was heavy throughout the year with many new oil and gas fields popping up in Hansford and Ochiltree counties, particularly. Wildcatting was both heavy and successful in North, West Central, and West Texas.

In Kansas . . . Kansas exploration ranked second in the nation under Texas, numberwise. Wildcat completions went over the 1,000 mark to 1,073 (129 oil, 47 gas, and 897 dry). Wildcat drilling was widespread up and down the Central Kansas uplift as always, became heavier as the months went by in northwestern counties as new production was uncovered on and around the Cambridge uplift, and continued strong in the Hugoton Embayment and Sedgwick basin. Several important new deep pools were opened inside shallow Hugoton gas field in the southwestern counties.

In Oklahoma . . . Sooner oil explorers completed 867 wildcats in 1956, coming in third in the nation. This is just a slight increase over the previous year when 832 were finaled. There were many significant discoveries in Oklahoma during the year, however, despite the rather slow wildcat campaign during the months. Success was widespread in the deep areas of southern, southwestern, and northwestern Oklahoma. The Anadarko basin got some highly important wildcats during the year as did the northern shelf areas and the counties on and adjacent to the Nemaha granite ridge. At year's end the wildcat spotlight turned on Cleveland County in the south-central as several Ordovician and Silurian pools were tapped. Both wildcatting and field work remained very heavy up in the Osage country of northeastern Oklahoma. The biggest part of the state's total completions came out of Osage County, making it one of the country's busiest drilling areas.

In the East . . . Illinois wildcat completions soared to 772 in 1956, leading all states east of the Mississippi River, and ranking just under fourth-ranking Louisiana. Focal point of the heavy exploration was Coles and Douglas counties. Several new pools were completed

★ DRILLING

Canada's four western provinces drilled 3,261 wells

	Total wells					Total 1955	Total wildcat wells				
	Total	Oil	Gas	Dry	Footage	comp.	Total	Oil	Gas	Dry	Footage
Alberta	1,861	1,371	138	352	9,967,437	1,590	371	62	56	253	2,137,543
Saskatchewan	1,092	790	11	291	4,568,900	885	297	75	2	220	1,264,926
Manitoba	252	195	0	57	579,704	362	45	3	0	42	132,765
British Columbia	56	6	35	15	322,526	*42	24	0	10	14	158,454
Total western Canada	3,261	2,362	184	715	15,438,567	2,879	737	140	68	529	3,693,688

*Includes Northwest Territories 4.

. . . Divided by depth classifications thusly

	A 0-1,250	B 1,250-2,500	C 2,500-3,750	D 3,750-5,000	E 5,000-7,500	F 7,500-10,000	G 10,000-12,500	H 12,500-15,000	I 15,000+
Alberta	8	112	152	383	981	196	21	8	0
Saskatchewan	4	78	200	754	47	8	1	0	0
Manitoba	6	197	38	11	0	0	0	0	0
British Columbia	0	0	4	29	13	6	3	1	0
Total western Canada	18	387	391	1,177	1,044	210	25	9	0

in these two areas, development was strong for the first part of the year, sharply dropping the last quarter. Kentucky drillers dug 440 wildcats, up considerably over the previous year.

In the Rockies . . . The mountain states have shown phenomenal exploratory drilling increases in the postwar years. The drilling spread into new provinces in 1956. Colorado, long the pace setter in Rocky Mountain wildcat drilling, reported a decline from the previous years, but still came out in front with 675 wildcat completions.

The Colorado decline is due to a lag in Denver basin drilling on the Colorado side. However, western Nebraska wildcat completions rose considerably over the previous year.

The San Juan basin of New Mexico more than doubled its wildcat completions. The discovery of Bisti-Gallup field set off a flurry of wildcat drilling that continued unabated during the year.

Utah enjoyed one of its most successful oil years with the emergence of the Paradox basin as a major oil province firing an intense exploratory search in the southeastern corner of the state . . . San Juan County.

Wildcatting in the Williston basin was above the previous year, but not by any outstanding margin.

Monthly rundown on total wells completed in U. S.

Wildcat Completions

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Oil	158	149	131	134	140	131	143	128	128	157	106	108
Gas	35	31	26	26	50	37	41	32	42	59	36	54
Dry	955	850	753	841	938	916	907	1,125	872	966	890	939
Total	**1,148**	**1,030**	**910**	**1,001**	**1,128**	**1,084**	**1,091**	**1,285**	**1,042**	**1,182**	**1,032**	**1,101**

Development Completions

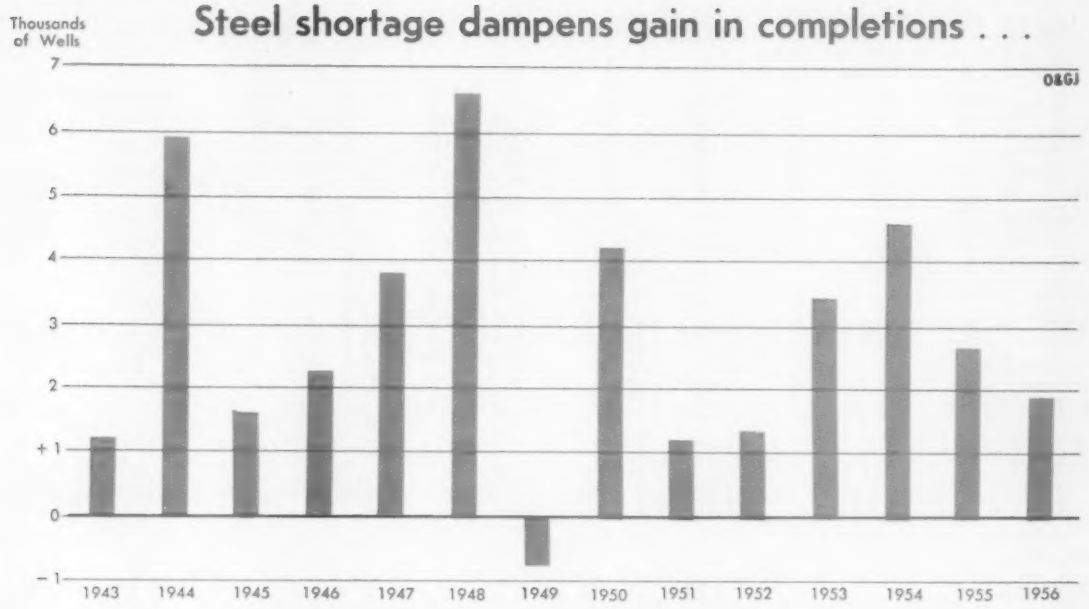
Oil	2,485	2,384	2,371	2,512	2,837	2,443	2,537	2,867	2,117	2,454	2,311	2,227
Gas	310	250	261	283	312	290	311	388	298	387	280	276
Dry	1,012	951	818	930	1,068	1,020	1,031	1,152	913	1,056	981	1,003
Total	**3,807**	**3,585**	**3,450**	**3,725**	**4,217**	**3,753**	**3,879**	**4,407**	**3,328**	**3,897**	**3,572**	**3,506**

Total Completions

Oil	2,643	2,533	2,502	2,646	2,977	2,574	2,680	2,995	2,245	2,611	2,417	2,335
Gas	345	281	287	309	362	327	352	420	340	446	316	330
Dry	1,967	1,801	1,571	1,771	2,006	1,936	1,938	2,277	1,785	2,022	1,871	1,942
Total	**4,955**	**4,615**	**4,360**	**4,726**	**5,345**	**4,837**	**4,970**	**5,692**	**4,370**	**5,079**	**4,604**	**4,607**

Footage (Thousands of Feet)

Wildcat	5,586	4,909	4,381	4,869	5,450	4,981	5,301	6,013	4,974	5,607	4,811	5,142
Development	14,906	14,065	13,545	14,391	16,110	14,132	14,638	16,301	12,533	14,401	13,632	13,221
Total	**20,492**	**18,974**	**17,926**	**19,260**	**21,560**	**19,113**	**19,939**	**22,314**	**17,507**	**20,008**	**18,443**	**18,363**



Operators finaled 58,160 wells

TOTAL well completions in the United States edged 2.6 per cent upward during 1956, compared with the 5.1 per cent gain registered the previous year. Well completions reached 58,160, up 1,478 over the 1955 figure of 56,682. Operators' plans at midyear called for a total of about 59,500 wells in 1956, but the pipe shortage from the steel strike cut this projected total.

. . . **Oil wells.** Oil-well completions were down 1.3 per cent in 1956 from the previous year to a total of 31,158 compared to 31,567 in 1955.

. . . **Gas wells.** Total gas wells in the country were up about 14 per cent over 1955. The industry finaled 4,115 gas producers.

. . . **Dry holes.** There were 22,887 dry holes finaled in 1956 compared to 21,502 in 1955.

. . . **Footage.** Total footage drilled in 1956 set another new record at 233,901,721 ft.

The decrease in oil-well completions is partially due to the slackoff in development drilling in many areas. California was off from 1,747 wells in 1955 to 1,680 oil wells in 1956. Total New Mexico oil wells of 861 compares favorably with 859 for the previous year. However, oil wells in Northwest New Mexico's San Juan basin were up from 10 to 86, while Southeast New Mexico totals dropped from 849 to 775 during the same period.

Texas' total oil wells were up 606 for the yearly comparison, reflecting light gains in some districts and decreases in others. Areas with fewer oil wells in 1956 were Southwest (District 1 and 4), Gulf Coast (District 2), and North Texas (District 9). On the other side of the scale Gulf Coast (District 3) came up from 888 oil wells to 937. West Texas (District 7-C and 8), showed the greatest change. In 1956 there were 4,725 oil wells compared with 3,912 the previous year. This is an increase of 813 wells, or 20.8 per cent, and represents a fairly heavy drilling program in all areas of West Texas throughout the year. East Texas total oil wells exceeded the previous year's figure by 75.

Citronelle Emerged as Major Field

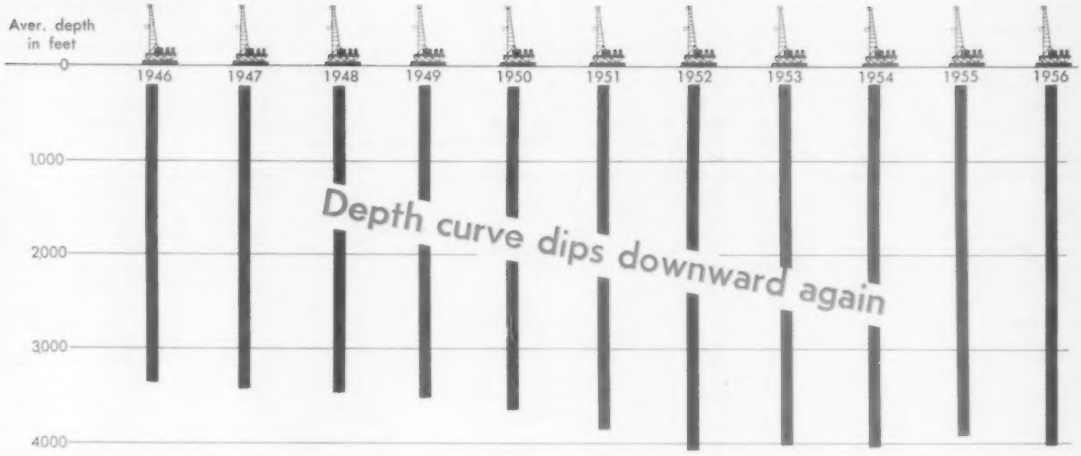
In the southeastern states the emergence of Citronelle as a major oil field gave Alabama 56 oil wells compared to 1 in 1955. However, oil-well completions in Mississippi fell from 180 to 145. Louisiana oil-well completions were also down considerably, from 2,556 to 2,082. Arkansas enjoyed a boom year in development drilling with 657 new oil wells reported compared to 429 in 1955.

Dry holes seemed to reign in various parts of the Rocky Mountain province. Colorado only finished 251 oil wells compared to 402 the previous year, but drilled 864 dry holes, most of them wildcats. Montana fared much better than any of the other Rocky Mountain states with 234 oil wells compared to 170 the previous year. This was one of the state's best years. Nebraska came up with almost the same number of new oil wells as the previous year, 301. North Dakota missed by only one well of having the same figure of new producers as in 1955. Development and wildcat drilling in that state netted 164 oil wells. Utah had the biggest percentage gain in the Rockies.

In the Eastern Interior, Kentucky total wells jumped from 1,592 in 1955 to 1,936 in 1956. The increase was entirely in oil wells and was caused by a boom in shallow drilling. Indiana picked up from 205 oil wells in 1955 to 288 in 1956, while Illinois dropped in oil wells from 2,100 last year to 1,674 in 1956.

How the nation's completions divided up statewise

	Total	Oil	Gas	Service	Dry	Total footage (1,000 ft.)	Average footage	Comp. 1955
Alabama	91	56	1	0	34	800	8,789	41
Arizona	2	0	1	0	1	12	6,200	1
Arkansas	1,002	657	13	0	332	3,005	2,997	804
California	2,306	1,680	51	2	573	10,566	4,581	2,465
Colorado	1,222	251	107	0	864	6,232	5,100	1,509
Florida	13	0	0	0	13	91	6,984	30
Georgia	8	0	0	0	8	27	3,355	2
Idaho	4	0	0	0	4	16	3,992	9
Illinois	3,808	1,674	63	5	2,066	8,771	2,303	3,892
Indiana	741	288	7	7	439	1,243	1,678	706
Kansas	4,941	2,240	381	78	2,242	17,103	3,462	4,958
Iowa	0	0	0	0	0	0	0	27
Kentucky	1,936	795	165	5	971	2,748	1,419	1,592
Louisiana	3,875	2,082	401	3	1,389	28,438	7,339	4,019
North	1,702	985	161	0	556	6,083	3,574	2,071
South	1,747	855	195	3	694	18,233	10,437	1,948
Offshore	426	242	45	0	139	4,122	9,678	inc. above
Maryland	3	0	2	0	1	13	4,255	0
Michigan	437	202	12	0	223	1,262	2,889	512
Mississippi	441	145	5	0	291	3,193	7,241	448
Missouri	34	4	0	0	30	26	765	1
Montana	495	234	7	1	253	2,440	4,930	411
Nebraska	918	301	1	0	616	5,201	5,665	891
Nevada	3	0	0	0	3	25	8,251	13
New Mexico	1,904	861	674	0	369	8,458	4,443	1,663
Northwest	850	86	630	0	134	3,274	3,852	587
Southeast	1,054	775	44	0	235	5,184	4,919	1,076
New York	512	222	14	213	63	750	1,465	378
North Dakota	263	164	0	0	99	1,977	7,518	250
Ohio	1,086	572	178	54	282	2,583	2,378	1,259
Oklahoma	8,056	4,825	321	434	2,476	27,821	3,453	8,411
Oregon	5	0	0	0	5	32	6,351	7
Pennsylvania	748	260	236	188	64	1,822	2,436	717
South Dakota	9	0	0	0	9	48	5,354	16
Tennessee	7	1	0	0	6	15	2,139	17
Texas	21,519	13,082	894	59	7,484	92,620	4,304	19,981
Southwest (1)	1,603	967	19	0	616	4,392	2,740	1,774
Gulf (2)	777	282	135	0	360	4,765	6,132	823
Gulf (3)	1,848	937	150	3	758	12,687	6,865	1,683
Southwest (4)	1,475	581	217	1	676	7,832	5,310	1,321
East (5 & 6)	1,133	485	82	2	564	5,682	5,015	984
West Central (7-B)	3,085	1,654	13	11	1,407	10,329	3,348	3,041
West 7-C & 8)	5,707	4,725	43	0	939	28,664	5,023	4,908
North (9)	4,569	2,478	39	42	2,010	13,067	2,860	4,392
Panhandle (10)	1,322	973	196	0	153	5,202	3,935	1,055
Utah	141	41	18	0	82	690	4,893	92
Virginia	5	0	5	0	0	24	4,857	0
Washington	2	0	0	0	2	17	8,469	5
West Virginia	693	73	506	0	114	1,867	2,694	640
Wyoming	930	448	52	0	430	3,966	4,265	915
Total 1956	**58,160**	**31,158**	**4,115**	**1,049**	**21,838**	**233,902**	**4,022**	
Total 1955	**56,682**	**31,567**	**3,613**	**760**	**20,742**	**226,270**	**3,992**	**56,682**
Total 1954	**53,930**	**29,773**	**3,977**	**1,012**	**19,168**	**218,986**	**4,061**	
Total 1953	**49,279**	**25,762**	**3,806**	**1,262**	**18,449**	**198,839**	**4,035**	
Total 1952	**45,821**	**23,466**	**3,255**	**1,482**	**17,618**	**187,190**	**4,085**	
Total 1951	**44,516**	**23,453**	**3,030**	**1,380**	**16,653**	**172,331**	**3,871**	



Depth records fall in nine states

PRODUCTION-DEPTH records were broken in three areas during 1956 . . . South Louisiana, Oklahoma, and Southwest Texas. Six states set new drilling-depth records . . . Oklahoma, Southeast New Mexico, Montana, Oregon, Georgia, and West Texas.

Deeper Production

. . . In Louisiana. Richardson & Bass et al. set a new producing-depth record for the state, country, and world at the costly 1-L Humble-L.L.&E. in Plaquemines Parish, Coastal Louisiana.

Not only did the operators dig the world's deepest hole, but they produced the planet's deepest oil. The ultradeep discovery flowed 206 bbl. of oil per day on ⅛-in. choke from Miocene sands at 21,443-65 and 21,419-35 ft., adding 3,500 ft. to the old producing-depth record set 3 years ago at Coles Levee in Kern County, San Joaquin Valley, California.

Deepest production until April 1956 was Shell Oil Co.'s Weeks Island field, about 100 miles from the Richardson & Bass well. The Richardson & Bass was last year's new deep-drilling record. But the new total depth is 22,750 ft. The California well, at one time the world's deepest producer, quit producing about 2 years ago.

. . . In Oklahoma. The Sooner producing-depth record of 14,510 ft. fell at British-American Oil Producing Co.'s fabulous 2 Harrison in shallow Knox field, Grady County.

The new laurel holder flowed 30-40 bbl. of distillate per hour and 5,500 M.c.f. of gas per day on tests from 15,250 to 15,310 ft. in Ordovician-Bromide sands. This British-American discovery set off a new deep search throughout the southeastern portion of the vast Anadarko basin, and is hailed as one of the three top discoveries of the year in the Mid-Continent region.

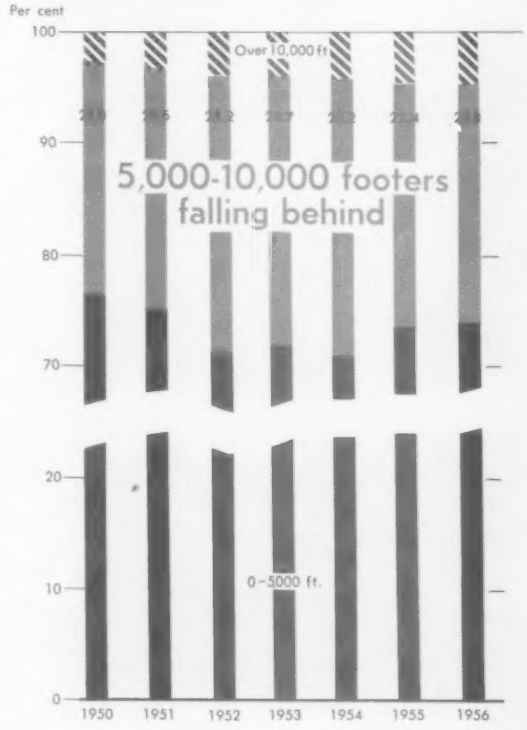
. . . In Southwest Texas. Amerada Petroleum Corp. 1 Lowe Craig, a Lowe Ranch field well in McMullen County, produced gas from the deep Edwards lime of Lower Cretaceous age at 14,479 ft., breaking the previous Southwest Texas record of 11,490 ft. in the Frio sands of Blackjack field in Aransas County. One of the exploratory highlights of the year was the new emphasis placed on the merit of deep Edwards lime production in Southwest Texas.

Deeper Drilling

The year-by-year increase in deep drilling throughout the nation's oil provinces rolled on unabated in 1956.

. . . In Oklahoma. Frankfort Oil Co. established the state's deepest drilling depth at its 1 Pruitt in Grady

More deep wells, but . . .



These wells set production depth records in U.S.

State or area—	Well and location; county—	Result	Year comp.	Pay zone	Prod. depth
South Louisiana	Richardson & Bass 1 L.L.E.-Humble "L," 35-19s-27e; Plaquemines	Oil	1956	Miocene	21,465
California	Richfield 67-29 Coles Levee; Kern (not producing)	Cond.	1953	Eocene	17,892
Oklahoma	British-American 2 Harrison, Knox field; Grady	Cond.	1956	Ord.-Bromide	15,310
Southeast New Mexico	Continental 1-A Bell Lake, 31-23s-34e; Lea	Gas	1955	Devonian	15,025
West Texas	Phillips 1-E. Puckett, Glenna pool; Pecos	Gas	1953	Ellenburger	15,000+
Southwest Texas	Amerada 1 Lowe Craig, Lowe Ranch; McMullen	Gas	1956	Edwards	14,479
Mississippi	Union Producing et al. 1 Logan, Tinsley field; Yazoo (not prod.)	Cond.	1951	Smackover	14,427
Wyoming	Pure 1 Unit, 11-33n-84w; Natrona	Oil	1948	Frontier	14,307
Texas Gulf Coast	Stanolind 1 Sanborn, S. William A-106; Matagorda	Cond.	1954	Frio	13,068
Montana	Sun-Phillips 2 Dynneson, 30-24n-58e; Richland	Oil	1955	Ordovician	12,654
East Texas	Tidewater 1 Ramey Unit, New Hope; Franklin	Cond.	1954	Smackover	12,341
Florida	Humble 1 Gulf Coast, Sunniland field; Collier (now abandoned)	Oil	1943	Glen Rose	11,626
Southwest Texas	Western Natural 14 St. Charles Ranch, Blackjack field; Aransas	Gas	1951	Frio	11,490
Alabama	Zach Brooks 1 Donovan, Citronelle; Mobile	Oil	1955	Rodessa	11,414
Texas Panhandle	Phillips 1 Troy "A," Laketon; Gray	Oil	1955	Ellenburger	11,370
Louisiana, North	Carter 1 Jones-O'Brien Unit, Red Rock; Webster	Oil	1955	Smackover	10,915
North Dakota	Stanolind 1 New Year Many Ribs, Sanish pool; McKenzie	Oil	1954	B. Miss.-U. Dev.	10,674
Utah	Carter 1 Peterson, 13-1s-1w, (USM); Uintah	Oil	1952	Wasatch	10,244
North Texas	Weiner 1 Hazlip, Mineral Creek; Grayson	Cond.	1952	Mulder	10,160
Colorado	Delhi-El Paso 5 Barker, 2-32n-14w; La Plata	Gas	1950	Paradox	9,841
New Mexico, N. W.	Southern Union 9 Barker Creek, 21-32n-14w; San Juan	Gas	1945	Pennsylvanian	9,468
Arkansas	Atlantic 1 McCamie-Patton C-216; Lafayette	Oil	1952	Smackover	9,453
South Dakota	Shell 1 State "A," 9-21n-4e; Harding	Oil	1953	Red River	8,690
West Virginia	Ohio 1 Kuykendall et al., Dry Fork district; Tucker	Gas	1946	Oriskany	8,410
Pennsylvania	American Locomotive 5 Steiner, Unity Twp.; Westmoreland	Gas	1946	Oriskany	8,014
Michigan	Michigan Gulf 1 Bateson, Kawkawlin field; Bay (now abandoned)	Oil	1946	Salina	7,850
Nebraska	Gulf 1 Sisson, 18-21n-58w; Kimball	Oil	1951	Dakota	7,431
Nevada	Shell 1 Unit, 27-8n-57e; Nye	Oil	1954	Volcanics	6,730
Kansas	Stanolind 1 Wall, 35-32s-23w; Clark	Oil	1951	Viola	6,576
Ohio	East Ohio 1 Phillips, Sec. 23, Washington Twp.; Harrison	Gas	1941	Silurian	5,899
New York	Kane 1 Lewis, West Union Twp.; Steuben	Gas	1942	Oriskany	5,228
Kentucky	United Carbon 1 Howe; Pike	Gas	1932	Devonian	5,170
Arizona	Humble 1 Navajo, 4-41n-28e; Apache	Oil	1955	Pennsylvanian	4,816
Illinois	Kingwood 24-A Shanafelt, 20-2n-2e; Marion	Oil	1943	Trenton	4,657
Maryland	Cumberland-Allegheny S-424 Beachy, Ryans Glade 8 Dist.; Garrett	Gas	1949	Oriskany	4,456
Tennessee	Nelson 1 Boos, Bryceville; Anderson	Gas	1955		3,404
Indiana	Lewis 1 Hill, 35-3s-14w; Posey	Oil	1939	McClosky	3,144
Missouri	Cities Service 1 Cook, Tarkio; Atchison	Oil	1944	Bartlesville	1,444

...and these are the record setters for drilling depths

State or area—	Well and location; county—	Result	Year comp.	Deepest formation	Total footage
South Louisiana	Richardson & Bass 1 L.L.E.-Humble "L," 35-19s-27e; Plaquemines	Oil	1956	Miocene	22,570
California	Ohio 72-4 K.C.L.-A, Paloma field; Kern	Dry	1954	Miocene	21,482
Wyoming	Superior 1 Unit, 27-27n-103w; Sublette	Dry	1949	Dakota	20,521
Mississippi	Vasen 1 Fee, 9-2s-11w; Stone	Idle			20,450
Texas Gulf Coast	Magnolia A-417 West Ranch; Jackson (compl. in field pay)	Oil	1955	Jackson	19,060
West Texas	Gulf 1 Northrup; Reeves (lost circulation)		1956	Miss.	18,771
Oklahoma	Frankfort 1 Pruitt, 16-4n-8w; Grady	Dry	1956	Springer	18,158
Southwest Texas	Superior 27 Welder, Portilla field; San Patricio	Oil	1951		17,966
Southeast New Mexico	Phillips 6 Lea-Mex, 23-17s-33e; Lea	Oil	1956	Granite	16,842
East Texas	Humble 1 McWatters, Freestone	Oil	1949	Smackover	16,347
Alabama	Humble 1 Williams, 10-3n-2e; Clark	Oil	1952	Jurassic	15,729
Florida	Gulf 1 State; Monroe	Dry	1947		15,155
Colorado	Mountain Fuel 1 Hiawatha, 14-12n-100w; Moffat	Gas	1952	U. Cretaceous	15,041
North Louisiana	C.V.O.C.-Oliphant 2 Banks, Cotton Valley field; Webster	Dry	1947	Salt	14,967
North Texas	Humble 1 Williams, D. Yglesias Sur. A-1393; Grayson	Dry	1953		14,363
Texas Panhandle	Gulf 1-E Porter "A," 413-43-H&TC; Lipscomb	Dry	1949	Ellenburger	14,278
North Dakota	Amerada 2 Kuam, 19-156n-95w; Williams	Oil	1953	Winnipeg	14,066
Montana	Mountain States-Phillips, 1 NP, 33-9s-21e; Carbon	Dry	1956	Chugwater	13,830
Utah	Equity & Pacific Western 1 Unit, 33-21s-21e; Grand	Dry	1949	Pennsylvanian	13,767
Northwest New Mexico	Magnolia 1 Jicarilla "A," 18-23n-2w; Rio Arriba	Gas	1955	Granite	13,590
West Virginia	Hope Nat. Gas 9634; Wood	Dry	1955		13,331
Oregon	Sinclair 1 Mapleton, 12-16s-10w; Lane	Dry	1955		12,880
Idaho	Phillips-Utah Southern 1 Juniper, 10-14s-30e; Oneida	Dry	1952		12,844
Arkansas	Shell 1 Browning-Burns Unit, 12-20s-23w; Columbia	Dry	1952	Smackover	12,650
Pennsylvania	The California Co. 1 Bennett; Sullivan	Dry	1951	Siluro-Ord.	12,343
Nevada	Continental-Standard of Calif. 1 Unit, 32-20n-60e; White Pine	Dry	1952		11,543
New York	N. Y. State Nat. Gas Co. 1 Kesselring, Van Etten Twp.; Chemung	Dry	1952	U. Cambrian	11,145
Michigan	Ohio-Pure 1 Reinhardt, 35-22n-2e; Ogemaw	Dry	1948	Cambro-Ord.	11,012
Washington	Standard of Calif. 1 Alderwood; Snohomish	Dry	1947	Mid. Eocene	11,002
North Carolina	Standard 1 Hatteras Light; Dare	Dry	1946	Granite	10,054
Virginia	The California Co. 1 Kipps Anthracite Coal; Montgomery	Dry	1949	Ordovician	9,936
South Dakota	Shell 1 Homme, 13-20n-12e; Perkins	Dry	1951	Granite	9,348
Nebraska	Stanolind 3 Lovercheck, 21-18n-55w; Banner	Dry	1952	Pre-Cambrian	8,864
Kansas	Stanolind 1 Feathers, 15-35s-33w; Seward	Gas	1947	"Crystalline"	8,243
Maryland	Snee 1 Schartzer; Garrett	Dry	1941	Helderberg	8,165
Ohio	Ohio 1-C Knowlton, Sec. 10, Independence Twp.; Washington	Dry	1933	Clinton	7,889
Illinois	Superior 17 H. C. Ford "C" Lease, New Harmony field; White	Oil	1952	Salem	7,682
Georgia	Sealy 1 Seminole Naval Stores, Land Lot 142, Land Dist. 21; Seminole	Idle	1956		7,620
Arizona	Sinclair 1 Navajo; Coconino	Dry	1952	Granite	7,214
Kentucky	Pure-Ashland 1-A Walker, 22-N-24; Webster	Dry	1949	Knox	6,686
Indiana	Continental 1 Cooper Est., 13-3s-14w; Gibson	Dry	1947	Trenton	6,405

County. Total depth in the Springer sands of Pennsylvania age was 18,158 ft. This Anadarko basin well was one of many that went below 15,000 ft. in this section of the state during the year.

...In Southwest New Mexico. Phillips Petroleum Co. set a deep record for New Mexico at its 6 Lea-Mex in Lea County. The wildcat went to granite at 16,842 ft., but was plugged back and completed at shallower depths as an oil producer.

...In Montana. Mountain States-Phillips Petroleum Co. 1 Northern Pacific hit the Chugwater at 13,830 ft. to give the Treasure State a new deep-hole record. Location of this dry wildcat venture is in Carbon County.

...In Oregon. Sinclair Oil & Gas Co. set a new drilling-depth record for the Pacific Northwest and Oregon at 1 Mapleton in Lane County. This well went down to 12,880 ft.

...In West Texas. Gulf Oil Corp. deepened its 1 Northrup in the Delaware basin to 18,771 ft. This Reeves County wildcat was slated for 19,000 ft. plus or minus, but lost circulation on the way down.

Depth Classifications

A look at the accompanying depth-classification tables shows how the industry scored in well completions by the various depth breakdowns.

... There were 5,585 wells completed in the below 1,250-ft. class in 1956. Kentucky, Texas, and Oklahoma, were the biggest contributors to this classification. A big drilling spree was noted in the shallow fringe areas of the Illinois basin in western Kentucky. North Texas and other Lone Star areas contributed a large number of shallow wells, as did northeastern Oklahoma.

... In the 1,250-2,500-ft. category, 14,174 wells were completed, making this the pace-setter in the various classifications. Illinois, Oklahoma, and Texas accounted for the biggest chunk of this drilling.

Illinois, Kansas, Oklahoma, and Texas led the parade of wells drilled in the 2,500-3,750-ft. class. Total wells drilled in this column was 14,169.

Colorado, Kansas, Oklahoma, New Mexico, and Texas were the top donors to the 8,942 wells completed in the 3,750-5,000-ft. class.

The middle classification, 5,000-7,500 ft., accounted for 8,526 wells. California, Colorado, Kansas, Louisiana, Nebraska, Oklahoma, and Texas took the lion's share of these.

How 1956 wells scored by depths

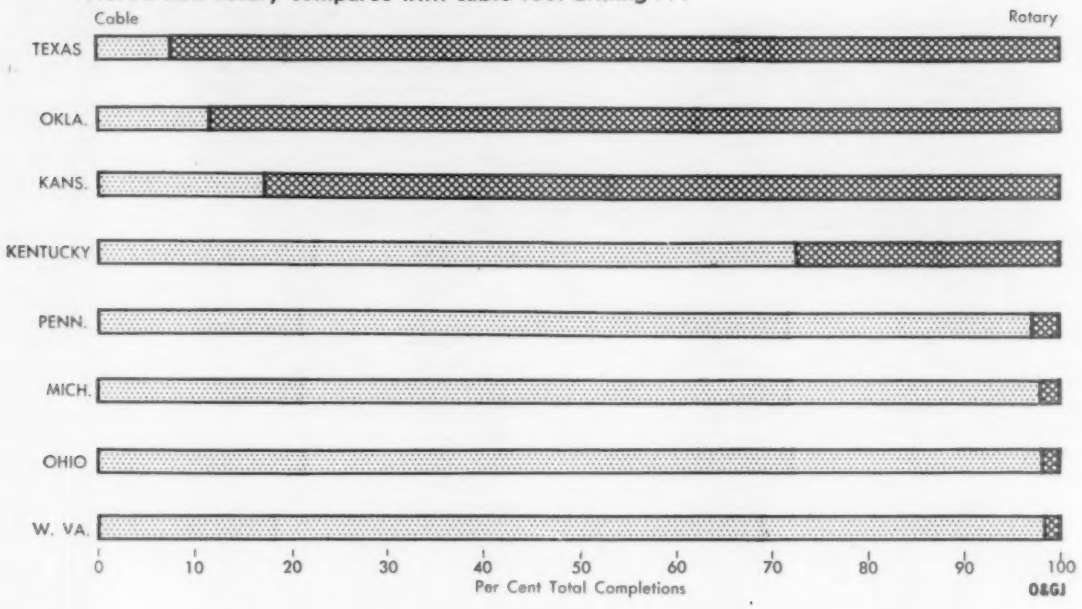
	A 0-1,250 ft.	B 1,250-2,500 ft.	C 2,500-3,750 ft.	D 3,750-5,000 ft.	E 5,000-7,500 ft.	F 7,500-10,000 ft.	G 10,000-12,500 ft.	H 12,500-15,000 ft.	I Over 15,000 ft.
Alabama	2	4	8	8	11	5	52	1	0
Arizona	0	0	0	0	2	0	0	0	0
Arkansas	31	464	289	134	71	13	0	0	0
California	234	476	405	404	360	269	116	40	2
Colorado	33	32	92	326	692	44	2	1	0
Florida	0	0	0	3	6	2	1	1	0
Georgia	1	2	1	3	1	0	0	0	0
Idaho	0	0	1	3	0	0	0	0	0
Illinois	412	1,659	1,720	17	0	0	0	0	0
Indiana	285	335	120	1	0	0	0	0	0
Kansas	101	637	2,350	1,640	212	1	0	0	0
Kentucky	1,069	617	217	31	1	1	0	0	0
Louisiana	75	815	364	198	466	705	697	436	119
North	71	797	320	114	243	113	42	2	0
South	3	14	42	72	163	424	550	381	98
Offshore	1	4	2	12	60	168	105	53	21
Maryland	0	0	0	3	0	0	0	0	0
Michigan	18	161	155	75	27	1	0	0	0
Mississippi	0	1	2	63	232	78	53	12	0
Missouri	28	5	1	0	0	0	0	0	0
Montana	16	95	90	81	97	112	3	1	0
Nebraska	1	12	51	160	689	5	0	0	0
New Mexico	64	364	474	466	338	47	88	61	2
Northwest	16	254	189	101	277	12	0	1	0
Southeast	48	110	285	365	61	35	88	60	2
Nevada	0	0	0	0	1	2	0	0	0
New York	0	483	11	17	1	0	0	0	0
North Oakota	1	6	31	17	31	173	2	2	0
Ohio	254	162	621	46	3	0	0	0	0
Oklahoma	993	2,175	2,323	1,059	865	522	93	23	3
Oregon	0	2	0	0	2	0	0	1	0
Pennsylvania	5	549	116	10	57	11	0	0	0
South Dakota	1	0	2	2	1	3	0	0	0
Tennessee	1	4	1	0	1	0	0	0	0
Texas	1,795	4,594	4,370	3,895	4,015	2,052	554	231	13
Dist. 1	406	378	389	276	122	10	18	2	2
Dist. 2	22	14	52	211	208	255	14	0	1
Dist. 3	98	107	101	172	447	695	204	17	7
Dist. 4	59	182	207	200	509	257	53	6	2
East	58	182	103	199	487	89	11	4	0
Dist. 7-B	321	1,007	552	633	568	4	0	0	0
West	90	705	1,487	1,480	1,008	512	223	201	1
Dist. 9	740	1,932	510	699	586	84	17	1	0
Dist. 10	1	87	969	25	80	146	14	0	0
Utah	13	10	20	15	71	10	1	1	0
Virginia	0	0	0	4	1	0	0	0	0
Washington	0	0	0	0	1	1	0	0	0
West Virginia	32	345	174	125	15	2	0	0	0
Wyoming	120	165	160	136	256	70	16	4	3
Total	5,585	14,174	14,169	8,942	8,526	4,129	1,678	815	142

...and how they were drilled by months

	A 0-1,250 ft.	B 1,250-2,500 ft.	C 2,500-3,750 ft.	D 3,750-5,000 ft.	E 5,000-7,500 ft.	F 7,500-10,000 ft.	G 10,000-12,500 ft.	H 12,500-15,000 ft.	I Over 15,000 ft.
January	497	1,136	1,188	734	742	411	169	68	10
February	434	1,052	1,069	729	740	362	146	78	5
March	405	969	1,063	753	626	349	129	56	10
April	383	1,150	1,129	796	721	336	134	66	11
May	465	1,277	1,377	808	820	379	143	62	14
June	433	1,167	1,228	781	718	294	145	60	11
July	519	1,254	1,208	693	684	370	159	71	12
August	606	1,514	1,395	812	782	386	126	63	8
September	454	1,011	1,061	715	615	304	125	71	14
October	534	1,274	1,233	739	735	347	132	69	16
November	411	1,142	1,143	688	718	281	140	65	16
December	444	1,228	1,075	694	625	310	130	86	15
Total	5,585	14,174	14,169	8,942	8,526	4,129	1,678	815	142

★ DRILLING

Here's how rotary compares with cable-tool drilling . . .



Kansas' shallow drilling busies cable-toolers

A SURVEY of 1956 drilling operations throughout the country revealed that about 16.3 per cent of all wells drilled in the United States were put down with cable tools. This is an increase over the previous year when cable-toolers drilled 14.3 per cent of total wells. Rotary rigs drilled the remaining 83.7 per cent.

These 1956 percentage figures are based on an estimated 9,484 cable-tool completions versus 48,676 rotary-tool completions. Total well completions in the United States rose to a new high of 58,160 wells.

Most of the nation's shallow drilling areas showed considerable gains in the number of wells completed with cable tools. The biggest gain is in western Kentucky where a surge of shallow drilling kept drillers busy throughout the entire year. Christian, Todd, Muhlenburg, and other counties in Kentucky recorded heavy cable-tool drilling. There were 1,415 wells completed in the whole state by cable tools.

. . . **Oklahoma,** long the big cable-tool drilling state, lost its first place to Kentucky this past year. Sooner cable-toolers drilled only 1,106 wells this past year compared to 1,654 in 1955. Development in the northeastern stripper areas of Oklahoma slackened off considerably shortly after the first of 1956, cutting into the number of cable tools in action.

. . . **Kansas** shot upward with 815 cable-tool completions compared to 385 in 1955. There was considerable drilling in the shallow eastern counties of that state in 1956 plus the usual heavy activity in the central, southern, and western counties.

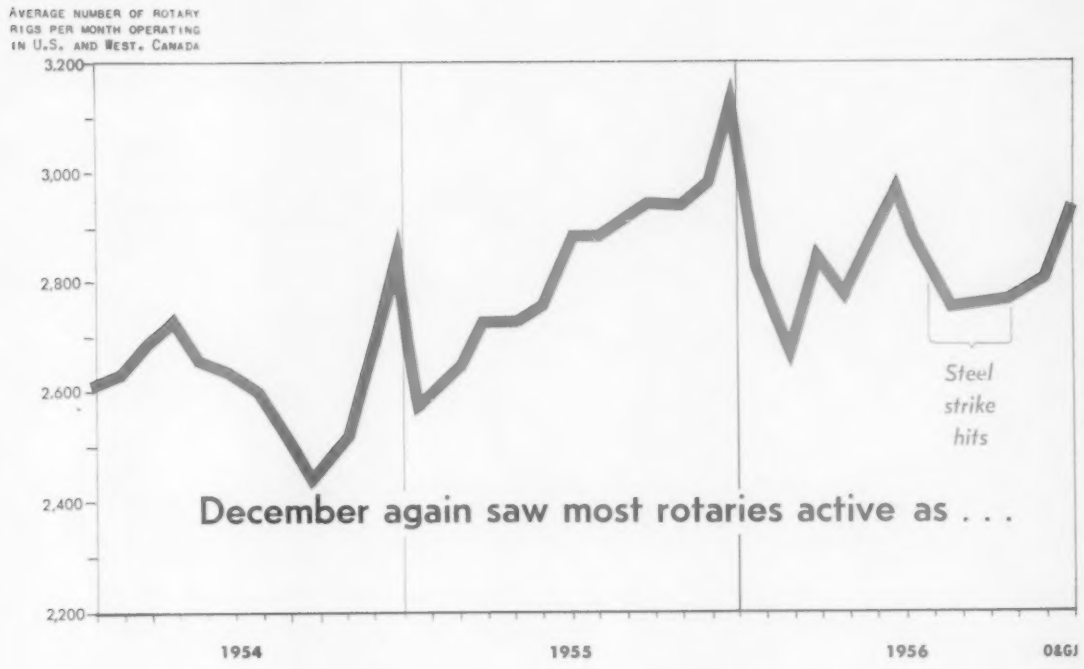
. . . **Total cable-tool completions** in Texas dropped from 1,480 to 1,099 in 1956. Cable-tool drilling in Texas is primarily concentrated in the western counties, with some reported in the Panhandle, north, and west-central areas.

. . . **Rocky Mountain** cable-tool operations showed an increase over the previous year. Colorado had 10 completions, Montana 83, Nebraska 15, Utah 6, and Wyoming, the leader with 121.

State-by-state scoreboard

State—	Cable	Rotary	Total comp.
Arkansas	73	929	1,002
Alabama	7	84	91
California	105	2,201	2,306
Colorado	10	1,212	1,222
Florida	0	13	13
Illinois	703	3,105	3,808
Indiana	404	337	741
Kansas	815	4,126	4,941
Kentucky	1,415	521	1,936
Louisiana	0	3,875	3,875
Michigan	349	88	437
Mississippi	1	440	441
Montana	83	412	495
Nebraska	15	903	918
New Mexico	155	1,749	1,904
New York	512	0	512
North Dakota	0	263	263
Ohio	1,073	13	1,086
Oklahoma	1,106	6,950	8,056
Pennsylvania	725	23	748
South Dakota	0	9	9
Texas	1,099	20,420	21,519
Utah	6	135	141
West Virginia	680	13	693
Wyoming	121	809	930
Miscellaneous	*27	46	73
Total 1956	**9,484**	**48,676**	**58,160**
Total 1955	8,254	48,428	56,682
Total 1954	7,715	46,215	53,930

*Tenn. 2, Mo. 17, Md. 3, Va. 5.



More wells drilled per rig in 1956

THE past year did not break any records in number of rotary rigs operating in the United States and western Canada, but rigs averaged more wells drilled per rig than in any previous year.

The average number of rigs operating during the year figured 2,843. With 51,854 rotary-drilled wells reported completed for the same period, rigs averaged approximately 18.24 wells per rig.

Although this figure was only fractionally higher than the averages of 1955 and 1954, the continuation of the upward trend reflected the steadily increasing efficiency in drilling techniques and equipment. It was especially significant in view of the greater depths of wells drilled in several of the more active areas, such as the Gulf Coast of Louisiana and Texas, West Texas and Southeast New Mexico, and Oklahoma.

The greatest number of rigs reported running at one time during the year was 3,132, this being at mid-December. This was short 206 rigs of equaling the 1955 high, an all-time record number of 3,338 rigs reported working during the corresponding week of that year.

February Again Showed Least Activity

By the first week of 1956, the number of active rotary rigs had dropped to a reported 3,023, a decrease of 315. The year closed with 2,759 rigs in operation. The smallest number reported at one time was 2,619, this being during the second week of February.

Starting with 340 more active rigs than were running at the beginning of 1955, drilling throughout most of the first half of 1956 and extending into July was maintained at levels well above those of the preceding year. The latter half of the year was a different story with drilling activity consistently below the 1955 levels.

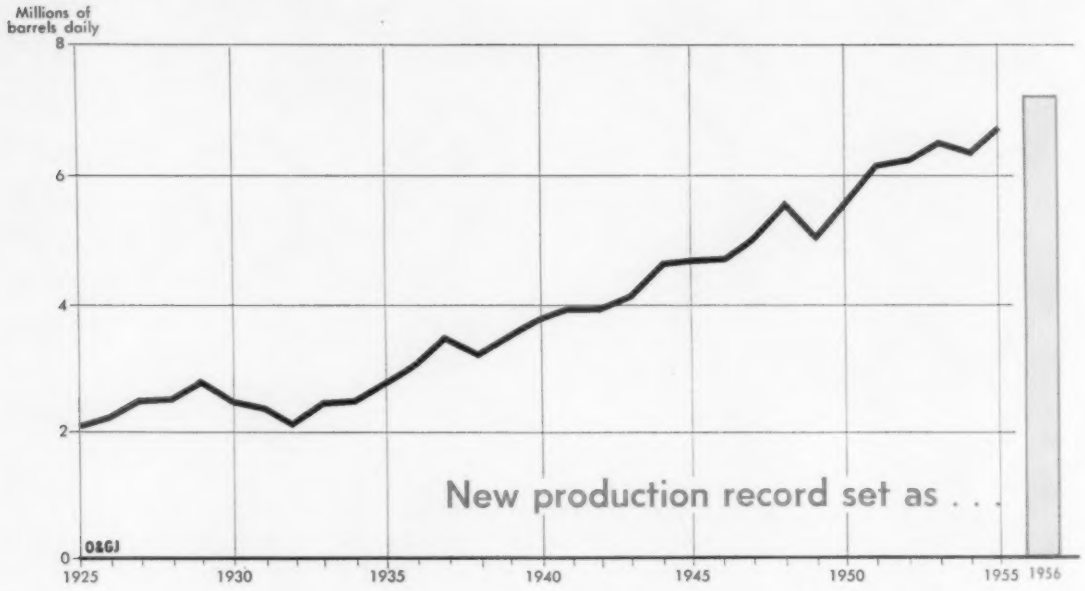
This was due primarily to a relatively sharper increase in drilling activity during the latter half of 1955 than was evident in the corresponding period of the past year. Generally speaking, the number of rigs operating during 1956 was more constant than during 1955. There was a difference of only 513 rigs between the greatest and smallest number of rigs reported running during 1956 as compared with a range difference of 764 rigs in the preceding year.

Only on the Gulf Coast did the number of operating rigs in any divisional grouping set any new records. More than 710 rigs were reported running in this region, including South Louisiana, South Texas, South Mississippi, and the southeastern states, late in December. Previous all-time high was 700 rigs at the close of the preceding year.

Rig activity for past 6 years

Year	No. rigs Jan. 1	No. rigs Dec. 31	Average number	Peak number	Low number
1956	3,023	2,759	2,843	3,132	2,619
1955	2,683	3,084	2,856	†3,338	2,574
1954	2,735	2,830	2,657	2,963	2,439
1953	2,775	2,795	2,779	3,079	2,580
1952	2,973	2,801	2,815	3,032	2,470
1951	2,406	3,066	2,675	3,181	2,119

*Based on Hughes Tool Co. figures. †All-time record number.



U. S. strains to supply W. Europe

SPURRED by the tensions in the Middle East and the closing of the Suez Canal, production of crude oil and lease condensate in the United States rose to an all-time high during 1956.

The effect of the Suez situation on U. S. production was immediately apparent. Daily production in late October had declined to 7 million barrels from a mid-summer peak of 7.1 million barrels per day. By year's end, daily production stood at 7.3 million barrels and was continuing to climb.

In the scramble to supply Western Europe with much-needed crude, Humble Oil & Refining Co. was forced to jump the price of Texas crude $0.25-$0.40 per barrel on January 3, 1957. Other purchasers followed suit and by mid-January the price increases had become widespread. The price rise will most certainly have a beneficial effect on U. S. production during 1957, probably contributing to make it another record year.

Cooler heads in the oil industry point out, however, that the present unusual demand for crude oil is only temporary. Once the normal flow of Middle East oil to Europe is restored, U. S. production will decline.

A deeper and more basic cause for the price rise is the tremendous increase in finding and development costs during the past 10 years. Today major companies estimate that it costs between $1.50 and $2.00 per barrel to find and prove up new reserves that are actually worth only $1.00 to $1.50 per barrel in the ground. In 1947, the cost was only $0.60 per barrel. Caught between rising finding costs and rapidly declining profits, producing companies were faced with either curtailing their domestic exploration efforts because of the unfavorable economics or a much-needed rise in the price of crude. Fortunately, Humble cut the Gordian knot.

Producing records tumble . . . All the important producing states except California and Oklahoma established new production records in 1956. Texas, largest producing state in the nation, showed an increase of 5.5 per cent over the 1955 figure. Louisiana was up 9.2 per cent over 1955, the previous record year. Much of Louisiana's increase can be attributed to the offshore production. And these new fields will be a dominant factor for many years to come.

Oklahoma Shows Gain

Oklahoma showed an increase of 5.6 per cent over 1955, but it appears unlikely that the state production will exceed the 1927 record in the next several years. Over half the state's production comes from the unallocated or stripper fields where the average production per well is considerably less than 8 bbl. per day. In addition, the present allowables in the deeper areas discourage active exploration because of the longer payouts when compared to neighboring states.

The rapid growth of the Rocky Mountains continued in 1956 with every producing state setting new records. Aneth in southeastern Utah bids fair to become one of the most important producing areas in the Rockies once a pipeline outlet is available. There is every reason to believe that the Rockies will continue to grow as a producing area. High daily allowables, low cost of acquiring large blocks of acreage, rapid payouts on discoveries and field wells . . . all these factors serve to lure oil companies into this vast young oil province.

U. S. production of crude oil and lease condensate

(Thousands of barrels)

	1956 prod. change	1956	1955	1954	1953	1952	1951	1950	Cum. prod.
Alabama	1,602	3,013	1,411	1,584	1,694	1,279	1,020	735	12,664
Arkansas	493	28,862	28,369	29,130	29,681	29,440	29,798	31,108	971,382
California	—3,078	351,734	354,812	355,865	365,085	359,450	354,561	327,607	10,761,105
Colorado	5,833	58,486	52,653	46,206	36,402	30,381	27,823	23,303	398,945
Florida	—15	480	495	548	543	591	596	487	4,833
Illinois	1,609	83,032	81,423	66,798	59,026	60,089	60,243	62,028	1,916,927
Indiana	258	11,246	10,988	11,204	12,823	12,037	11,100	10,699	270,121
Kansas	2,648	124,317	121,669	119,317	114,566	114,807	114,522	107,586	2,835,076
Kentucky	1,935	17,453	15,518	13,791	11,518	11,918	11,622	10,381	334,066
Louisiana	25,026	296,036	271,010	246,558	256,632	243,929	232,281	208,965	4,107,462
Michigan	—419	10,847	11,266	12,028	12,285	13,251	13,927	15,826	395,851
Mississippi	2,938	40,679	37,741	34,240	35,620	36,310	37,039	38,236	505,688
Montana	5,747	21,401	15,654	14,195	11,920	9,606	8,958	8,109	249,985
Nebraska	5,047	16,250	11,203	7,783	6,344	2,660	2,558	1,547	54,182
Nevada	3	67	64	33					164
New Mexico	5,026	87,984	82,958	74,820	70,441	58,681	52,719	47,367	1,109,998
New York	—116	2,788	2,904	3,257	3,800	4,242	4,254	4,143	187,846
North Dakota	2,278	13,421	11,143	6,025	5,183	1,549	25		37,346
Ohio	492	4,845	4,353	3,880	3,610	3,350	3,140	3,383	644,177
Oklahoma	11,445	214,262	202,817	185,851	202,570	190,435	186,869	164,599	7,417,913
Pennsylvania	—181	8,350	8,531	9,107	10,649	11,233	11,345	11,859	1,194,788
Texas	58,172	1,111,469	1,053,297	974,275	1,019,164	1,022,139	1,010,270	829,874	19,913,473
Utah	65	2,292	2,227	1,905	1,807	1,737	1,305	1,228	13,154
West Virginia	—83	2,237	2,320	2,902	3,038	2,602	2,757	2,808	456,816
Wyoming	5,549	105,032	99,483	93,533	82,618	68,074	68,929	61,631	1,433,467
Other states	—6	113	119	153	63	46	50	65	2,400
Total U. S.	**132,268**	**2,616,696**	**2,484,428**	**2,314,988**	**2,357,082**	**2,289,836**	**2,247,711**	**1,973,574**	**55,229,829**
Daily avg.	**361**	**7,149**	**6,807**	**6,342**	**6,458**	**6,256**	**6,158**	**5,407**	

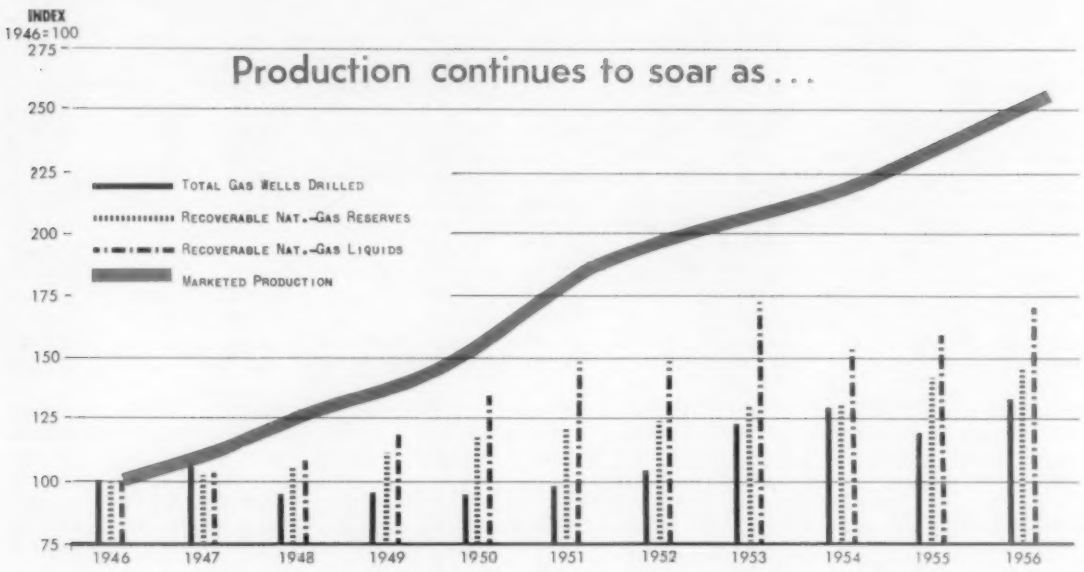
Producing records by states . . . and the tally for 1956

(Thousands of barrels)

	Record year		Production in record year
Alabama	1956		3,013
Arkansas		1925	77,398
California		1953	365,085
Colorado	1956		58,486
Florida		1951	596
Illinois		1940	147,647
Indiana		1953	12,823
Kansas	1956		124,317
Kentucky	1956		17,453
Louisiana	1956		296,036
Michigan		1939	23,462
Mississippi		1948	45,761
Montana	1956		21,401
Nebraska	1956		10,923
Nevada	1956		67
New Mexico	1956		87,984
New York		1882	6,685
North Dakota	1956		13,421
Ohio		1896	23,941
Oklahoma		1927	277,775
Pennsylvania		1891	31,424
Texas	1956		1,111,469
Utah	1956		2,292
Virginia		1947	61
West Virginia		1900	16,196
Wyoming	1956		105,032

	Bbl. daily 1956	Producing wells	Daily avg. per well
Alabama	8,232	156	52.8
Arkansas	78,858	4,789	16.5
California	961,022	36,057	26.7
Colorado	159,798	2,162	73.9
Florida	1,311	11	119.2
Illinois	226,863	37,684	6.0
Indiana	30,727	5,189	5.9
Kansas	339,664	37,095	9.2
Kentucky	47,686	17,693	2.7
Louisiana	808,842	20,247	39.9
Michigan	29,637	4,103	7.2
Mississippi	111,145	2,429	45.8
Montana	58,473	4,009	14.6
Nebraska	44,399	1,013	43.8
Nevada	183	2	91.5
New Mexico	240,393	9,465	25.4
New York	7,617	17,237	0.4
North Dakota	36,669	750	48.9
Ohio	13,238	19,990	0.7
Oklahoma	585,415	75,756	7.7
Pennsylvania	22,814	56,082	0.4
Texas	3,036,801	171,468	17.7
Utah	6,262	104	60.2
West Virginia	6,112	14,333	0.4
Wyoming	286,973	6,416	44.7
Miscellaneous	309	162	1.9
Total U. S.	7,149,443	544,402	13.1

★ PRODUCTION—RESERVES



Gas-well drilling rebounds from slump

GAS producers have scored an impressive comeback in their drilling campaign although the threat of federal controls still looms as a sword of Damocles over the industry. Nearly all key producing states logged substantial increases in drilling activity during 1956. Oklahoma was the only key state that failed to show a gain in total gas completions, but the state's wildcat discoveries were up one-third over the 1955 figure.

Significant gains in total wells in Texas, Louisiana, and New Mexico combined to make 1956 a record year. And what is more important, the large number of successful wildcats may well mean another record drilling year in 1957 in the natural-gas industry. In 1956 there were 469 successful wildcats completed as gas wells. This is 116 wells above the 1955 figure.

Several factors are responsible for the record drilling activity:

- Optimistic outlook for eliminating federal control of the industry.
- Increasing demand for gas as a fuel.
- New pipeline outlets, either under construction or on the drawing boards.
- More favorable economics in gas exploration as compared to oil exploration.

Marketed production in the United States showed an increase of 9.3 per cent over 1955. Texas, principal gas-producing state, accounts for slightly over half the total U. S. production and harbors nearly half the proved reserves in the country.

Today the United States has proved reserves of

Eleven states marketed 95 per cent of nation's natural gas

(Millions of cubic feet)

State—	1956	Per cent change over 1955	1955	Per cent change over 1954	1954	Per cent change over 1953	1953	Cumulative 1906-56	Per cent of U. S.
Texas	5,180,900	9.5	4,730,798	3.9	4,551,232	3.8	4,383,158	54,806,907	40.0
Louisiana	1,879,000	11.8	1,680,032	20.1	1,399,222	8.2	1,293,644	18,950,572	13.8
Oklahoma	649,800	5.7	614,976	—0.2	616,355	2.7	599,955	12,986,899	9.5
California	555,400	3.2	538,178	6.1	507,289	—4.5	531,346	13,558,090	9.9
New Mexico	618,200	14.3	540,664	20.3	449,346	12.6	399,086	4,332,069	3.2
Kansas	508,700	8.0	471,041	14.2	412,369	—2.0	420,607	6,160,323	4.5
West Virginia	220,000	3.6	212,403	10.9	191,601	2.7	186,477	9,421,390	6.9
Pennsylvania	102,200	3.0	99,172	—32.0	145,934	38.3	105,558	5,311,734	3.9
Mississippi	196,700	20.5	163,167	16.2	140,448	—9.0	154,254	1,391,889	1.0
Wyoming	81,700	5.0	77,819	9.5	71,068	—6.8	76,262	1,557,881	1.1
Kentucky	76,000	3.8	73,214	0.7	72,713	1.8	71,405	1,796,504	1.3
Subtotal	**10,068,600**	**9.4**	**9,201,464**	**7.5**	**8,557,577**	**4.1**	**8,221,752**	**130,274,258**	**95.1**
Other states	**209,500**	**2.7**	**203,887**	**10.2**	**184,969**	**9.6**	**175,164**	**6,703,422**	**4.9**
Total United States	**10,278,100**	**9.3**	**9,405,351**	**7.6**	**8,742,546**	**4.1**	**8,396,916**	**136,977,680**	**100.0**

Reserves upped 3.6 per cent

(Billion cubic feet at 60° F. and 14.65 psia.)

	January 1, 1956*	January 1, 1957	Change
Arkansas	1,164	1,165	1
California	8,893	8,750	—143
Colorado	2,254	2,460	206
Illinois	233	234	1
Indiana	33	35	2
Kansas	16,293	16,800	507
Kentucky	1,262	1,240	—22
Louisiana	42,436	45,900	3,464
Michigan	326	350	24
Mississippi	2,608	2,600	—8
Montana	720	700	—20
Nebraska	203	210	7
New Mexico	18,585	20,000	1,415
New York	76	77	1
North Dakota	281	300	19
Ohio	810	837	27
Oklahoma	13,205	13,700	495
Pennsylvania	754	760	6
Texas	108,288	110,111	1,823
Utah	421	450	29
West Virginia	1,565	1,400	—165
Wyoming	3,196	3,450	254
Others	92	95	3
Total United States	**223,698**	**231,624**	**7,926**

*American Gas Association figures as of December 31, 1955.

502 more gassers in '56

	1955		1956		Change
	Field wells	Successful wildcats	Field wells	Successful wildcats	in total wells
Arkansas	6	4	5	8	3
California	50	14	42	9	—13
Colorado	61	23	87	20	23
Illinois	10	6	58	5	47
Indiana	22	0	6	1	—15
Kansas	328	34	334	47	19
Kentucky	150	12	164	1	3
Louisiana	249	33	338	63	119
Michigan	17	2	10	2	—7
Mississippi	1	0	4	1	4
Montana	13	3	6	1	—9
Nebraska	3	1		1	—3
New Mexico	553	11	664	10	110
Ohio	243	7	173	5	—72
Oklahoma	328	31	280	41	—38
Pennsylvania	284	7	225	11	—55
Texas	471	132	689	205	291
Utah	2	8	13	5	8
West Virginia	432	11	491	15	63
Wyoming	37	9	40	12	6
Others	0	5	17	6	18
Total	**3,260**	**353**	**3,646**	**469**	**502**

231.6 trillion cubic feet. Based on the present rate of consumption, this reserve is equal to 22 years' supply. However, the anticipated demand for natural gas as a fuel will reduce this reserve to under 15 years' supply.

Significant Undeveloped Reserves

Offshore fields . . . Slowly the offshore fields are emerging as a large new gas reserve. Much of this potential is unproved, however, because operators simply complete the discovery as a shut-in gas well or as a gas-condensate well. Lack of pipeline connections deters further development.

Conservative estimates of 21.5 trillion cubic feet of undeveloped offshore gas reserves have appeared in the bulletin of the American Association of Petroleum Geologists (Atwater, Gordon I., "Future of Louisiana Offshore Oil Province," November 1956, pages 2624-35). And this is nearly 10 per cent of the present proved reserves in the United States. Development of these reserves will be slow, but the record of the past 2 years clearly indicates the importance of these offshore gas fields.

Texas . . . Although 75 per cent of Texas' proved reserves are concentrated in only 22 major fields in the state, there are several areas that hold out promise of large undeveloped reserves.

Puckett field in Pecos County emphasizes anew the importance of the deep Ellenburger reserves in the West Texas-New Mexico area. The Delaware basin in particular should live up to advance billing, but deep drilling is the only answer to uncovering the gas potential.

And South Texas with its deep Edwards trend took over the exploration spotlight in 1956 when the Atascosa County wildcat cored 580 ft. of porous limestone. Drilling has already outlined a trend of gas-condensate fields that is 50 miles long. Production is from the Edwards limestone at drilling depths of 10,000-12,000 ft.

The Crane-Pettet porosity belt in East Texas has altered the thinking of exploration men in the area and undoubtedly similar gas-condensate trends will be found. Production along this trend is entirely independent of structure. The present producing area is a huge strat trap some 50 miles long extending across East Texas into North Louisiana.

Deeper pays and new pays have pushed the Texas Panhandle into the forefront on the Texas scene. The deep drilling campaign within the limits of the old Hugoton gas field has met with gratifying results and the accelerated exploration program in the Anadarko basin has had a phenomenal success ratio, bordering on 50 per cent. Much of the Anadarko production to date has been gas and there is every reason to believe that significant proved gas reserves depend only upon development drilling and pipeline outlets.

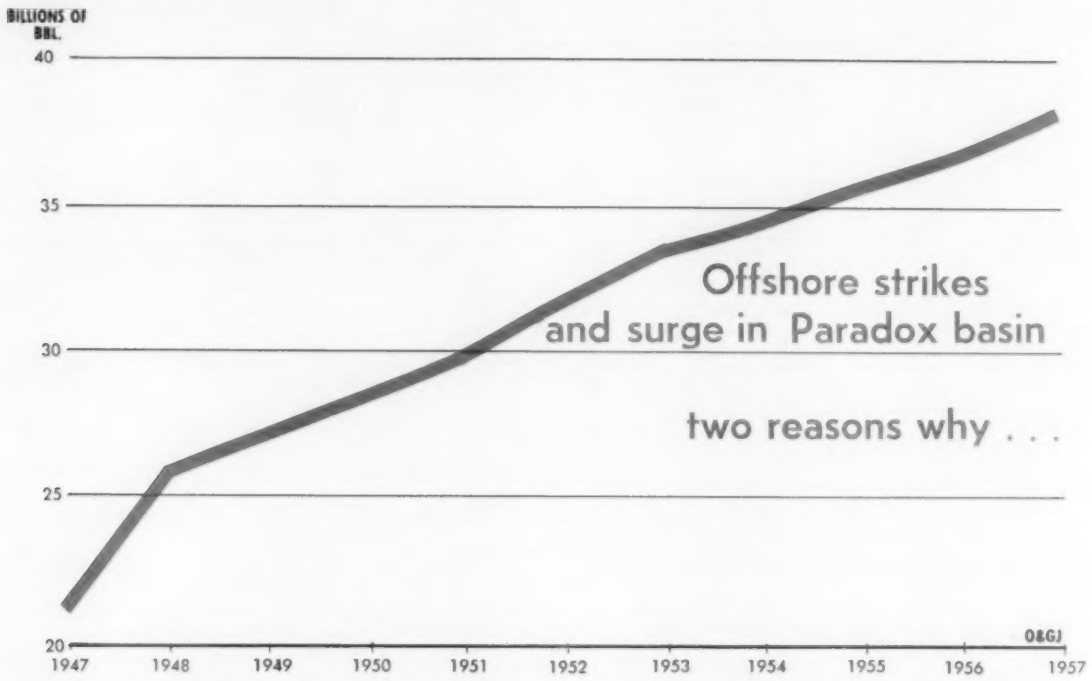
Mid-Continent . . . Kansas and Oklahoma had an active year during 1956.

Harper County, Oklahoma, with its multiple-pay zones and high initial potentials should rapidly develop into a major gas reserve with the promise of a pipeline outlet. And Union Oil Co. poured gasoline on the already blazing Anadarko basin exploration fire with a discovery 25 miles from the nearest production. The well (Union 1 McCormick, 14-22n-20w, Woodward County, Oklahoma) was completed for an initial potential of 25 M.M.c.f. of gas plus 15.5 bbl. of condensate per M.M.c.f. from a Morrow sand at 8,234-44 ft. Actual sand thickness was 53 ft.

Deep Simpson gas reserves in southern Oklahoma are now a reality with the successful completion of the deepest well in Oklahoma, British-American Producing Co. 2 Harrison in southeastern Grady County. Present data point to a major gas reserve that will be the equal to a 100-million-barrel oil field.

Rocky Mountains . . . Utah, Wyoming, and Colorado, key gas states in the Rockies, registered increases in both drilling activity and reserves during the year. Reserves along the route of the Pacific Northwest pipeline will be steadily developed during the year. Best pay zones to date are Tertiary and Cretaceous sands. Better completion techniques have made many of these zones economic where formerly the well would have been abandoned.

★ PRODUCTION—RESERVES



Reserves show best gain since 1952

NET gain in total hydrocarbon reserves for the United States was higher in 1956 than at any time since 1952. Two areas were largely responsible . . . Utah's Paradox basin and Louisiana's tidelands.

The gross addition to reserves of crude and natural-gas liquids amounted to 4,373 million barrels; of this, 3,756 million was crude, and 617 million natural-gas liquids. Deducting an all-time high production of 2,930 million barrels, the net gain stands at 1,443 million barrels for the year. A further breakdown reveals that 1,187 million of this was crude, and 256 million natural-gas liquids.

As of January 1, 1957, then, the proved United States reserves of total hydrocarbon liquids are estimated to be 38,391 million barrels. Of this, 32,697 million is crude oil, and 5,694 million is natural-gas liquids.

U. S. oil operators completed 13,034 wildcat exploratory wells during the year, and 2,082 of them opened new fields, oil or gas. This ratio of success, 15.9 per cent, is a drop from the past 2 years, when the ratio hovered around 17.5 per cent.

As usual, revisions and extensions of older fields were responsible for the bulk of the gain in gross reserves, 3,541 million barrels falling into this category, while only 831 million resulted from new-field discoveries. The largest contributor to the "revision and extension" column was South Louisiana, with a gross addition of about a billion barrels; the beginning of development offshore, and the realization of the vast potential of those fields already discovered, swelled this reserve total tremendously. Texas, California, Oklahoma, and Kansas followed in that order.

The substantial surge in coastal Louisiana reserves is the first concrete showing for these fields in reserve tabulations, and development drilling plus new wildcats in 1957 should reveal even greater gains this year. Main Pass Block 69 field joined the list of the nation's

Liquid-hydrocarbons reserves

(Millions of barrels)

	Jan. 1, 1957	Jan. 1, 1956*	Change
Arkansas	418.5	415.1	3.4
California	4,526.0	4,582.9	—56.9
Colorado	406.5	426.5	—20.0
Illinois	766.0	755.4	10.6
Kansas	1,188.0	1,171.2	16.8
Kentucky	140.5	124.7	15.8
Louisiana	5,224.0	4,302.9	921.1
Michigan	72.8	60.8	12.0
Mississippi	480.0	481.9	— 1.9
Montana	429.4	370.8	58.6
New Mexico	1,363.0	1,257.2	105.8
North Dakota	281.0	254.0	27.0
Oklahoma	2,519.0	2,407.3	111.7
Pennsylvania	135.1	143.0	— 7.9
Texas	18,219.0	18,190.4	28.6
Utah	139.1	35.1	104.0
West Virginia	74.5	65.5	9.0
Wyoming	1,645.0	1,600.3	44.7
Others	363.9	303.4	60.5
Total United States	**38,391.3**	**36,948.4**	**1,442.9**

Estimated proved recoverable crude-oil reserves

(Thousands of barrels)

	Proved reserves 1-1-56	1956 discoveries	1956 extensions and revisions	1956 production	Proved reserves As of 1-1-57	Proved reserves Year's change	Proved reserves Per cent of U. S.
Alabama	16,000	0	49,013	3,013	62,000	46,000	0.19
Arkansas	370,000	5,000	28,780	28,780	375,000	5,000	1.15
California total	4,258,000	32,000	266,734	351,734	4,205,000	—53,000	12.86
Coastal	914,000	14,000	59,781	82,781	905,000	— 9,000	2.77
Los Angeles	1,245,000	10,000	52,042	117,042	1,190,000	—55,000	3.64
San Joaquin	2,099,000	8,000	154,911	151,911	2,110,000	11,000	6.45
Colorado	414,000	7,000	30,486	58,486	393,000	—21,000	1.20
Illinois	737,000	5,000	90,032	83,032	749,000	12,000	2.29
Indiana	57,000	3,000	5,246	11,246	54,000	— 3,000	0.17
Kansas	998,000	19,000	125,317	124,317	1,018,000	20,000	3.11
Kentucky	116,000	4,000	30,453	17,453	133,000	17,000	0.41
Louisiana total	3,367,000	130,000	1,000,937	283,937	4,214,000	847,000	12.89
North	718,000	20,000	100,441	52,441	786,000	68,000	2.40
South	2,649,000	110,000	900,496	231,496	3,428,000	779,000	10.49
Michigan	60,000	2,500	20,347	10,847	72,000	12,000	0.22
Mississippi	424,000	13,000	20,391	39,391	418,000	— 6,000	1.28
Montana	364,000	24,000	55,401	21,401	422,000	58,000	1.29
Nebraska	74,000	15,000	20,250	16,250	93,000	19,000	0.28
New Mexico	915,000	50,000	90,601	87,601	968,000	53,000	2.96
New York	67,000	0	0	2,800	64,200	— 2,800	0.19
North Dakota	254,000	5,000	35,421	13,421	281,000	27,000	0.86
Ohio	*56,000	300	4,545	4,845	56,000	0	0.17
Oklahoma	2,053,000	50,000	250,262	214,262	2,139,000	86,000	6.54
Pennsylvania	140,000	0	350	8,350	132,000	— 8,000	0.40
Texas total	15,145,000	250,000	750,531	1,076,531	15,069,000	—76,000	46.09
East	2,790,000	18,000	50,025	138,025	2,720,000	—70,000	8.32
Gulf Coast	3,278,000	20,000	100,685	210,685	3,188,000	—90,000	9.75
North	1,134,000	20,000	50,943	134,943	1,070,000	—64,000	3.27
Panhandle	430,000	25,000	40,803	36,803	459,000	29,000	1.41
Southwest	1,352,000	18,000	90,381	106,381	1,354,000	2,000	4.14
West	6,161,000	200,000	366,694	449,694	6,278,000	117,000	19.20
Utah	35,000	100,000	6,292	2,292	139,000	104,000	0.43
West Virginia	35,000	0	10,237	2,237	43,000	8,000	0.13
Wyoming	1,550,000	7,000	140,032	105,032	1,592,000	42,000	4.87
Others†	5,000	100	1,791	691	6,200	1,200	0.02
Total United States	**31,510,000**	**721,900**	**3,033,449**	**2,567,949**	**32,697,400**	**1,187,400**	**100.00**

*Adjusted. †Arizona, Florida, Missouri, Nevada, South Dakota, Tennessee, Virginia, Idaho.
Note: Figures for Texas production are from Railroad Commission of Texas.

"giant" fields* in 1956 as the number of producing wells more than doubled (to 93), and the field produced 4½ million barrels of oil. Offshore operators maintain that at least half a dozen other offshore fields will join the giant list eventually, but the proved status for these has yet to come, through development and performance.

Second-most-important addition to the country's producing list were the fields of the Paradox basin, almost entirely a 1956 story. Again, development and performance must determine the true stature of Aneth and other large Paradox fields, but optimistic evaluations credit the basin with as much as 300 million barrels of new oil during the year. Such figures are not reflected in the tables on the following pages, but 1957 drilling may project these fields into major field categories.

Deep drilling in southern and western Oklahoma uncovered vast new quantities of oil, gas, and distillate, and it can be safely said that the Sooner State is due for an accelerated search throughout the Anadarko basin and the Hugoton embayment in the next 5 years.

The Rocky Mountain province, outside the Paradox boom, contributed many important new fields, but some states, notably Nebraska and Colorado, were not as successful in the search as in previous years. Year-end discoveries in Montana and North Dakota should assure an active wildcat campaign in those states during the coming year; the discovery of Outlook field in Sheridan County, Montana, and Northern Pump Co.'s field opener in Billings County, North Dakota, will both go on record as 1957 strikes, but they should stimulate lots of drilling in both states. The Williston basin should see a good year in 1957.

Although 1956 was a good year for oil finding, and although it may presage a new cycle of discovery, all signs point to a need for even greater success if future demand is to be met. To keep ahead of steadily soaring production, explorers are going to have to find more oil than ever before in history. And the odds are against them. Here are new ideas now being mulled

*These giant fields are marked with an asterisk in the tables of production and estimated remaining reserves for the larger fields of the United States. These tables appear following this article.

Estimated proved reserves of natural-gas liquids

Includes Condensate, Natural Gasoline, and Liquefied Petroleum Gases

(Thousands of barrels)

	Proved reserves 1-1-56*	1956 discoveries	1956 extensions and revisions	1956 production	Proved reserves As of 1-1-57	Proved reserves Year's change	Proved reserves Per cent of U. S.
Arkansas	45,124	471	295	2,390	43,500	—1,624	0.8
California	324,941	5,418	25,601	34,960	321,000	—3,941	5.6
Colorado	12,511	347	1,470	828	13,500	989	0.2
Illinois	18,457	113	1,290	2,860	17,000	—1,457	0.3
Indiana	132	3	15	25	125	— 7	...
Kansas	173,236	295	2,149	5,680	170,000	—3,236	3.0
Kentucky	8,675	10	1,605	2,790	7,500	—1,175	0.1
Louisiana	935,950	18,000	99,150	43,100	1,010,000	74,050	17.8
Michigan	872	10	48	93	837	— 35	...
Mississippi	57,876	1,564	6,230	3,670	62,000	4,124	1.1
Montana	6,857	124	746	327	7,400	543	0.1
Nebraska	6,436	259	500	395	6,800	364	0.1
New Mexico	342,207	1,543	68,600	17,350	395,000	52,793	6.9
Ohio	1,557	4	120	31	1,650	93	...
Oklahoma	354,354	7,946	50,900	33,200	380,000	25,646	6.6
Pennsylvania	3,024	15	205	144	3,100	76	0.1
Texas	3,045,361	70,729	237,910	204,000	3,150,000	104,639	55.4
Utah	108	4	13	5	120	12	...
West Virginia	30,526	184	5,690	4,900	31,500	974	0.6
Wyoming	50,348	1,572	5,250	4,170	53,000	2,652	0.9
Others	20,013	232	660	905	20,000	— 13	0.4
Total United States	**5,438,565**	**108,843**	**508,447**	**361,823**	**5,694,032**	**255,467**	**100.00**

*Source: American Gas Association.

over by the nation's oil finders as possible approaches to the problem:

1. Research aimed exclusively at ferreting out the elusive stratigraphic trap.

2. Reexamination in detail of every previously productive structure in the United States, followed by a "why not?" search of nonproductive ones.

3. Application of new techniques in every conceivable way; while reexamining old structures and fields, retest old wells with modern methods. Case in point . . . fracturing. The year's most dramatic example of this approach was the fracture job performed on 1 Wheeler, discovery well of Oklahoma's great Cushing field; completed in 1912, it produced until 1948, and was plugged. In August 1956, it was reworked and fractured in Red Fork sand at 2,500 ft. and flowed 648 bbl. daily on a 23/64-in. choke. Not a bad record for a 44-year-old well.

How "giant" fields compare with all fields

Crude Oil and Natural Gas Liquids

(Millions of barrels)

State—	Number giants	1956 production All fields	1956 production Giant fields	1956 production Giants' per cent	Estimated ultimate All fields	Estimated ultimate Giant fields	Estimated ultimate Giants' per cent	Remaining reserves All fields	Remaining reserves Giant fields	Remaining reserves Giants' per cent
Texas	75	1,280.53	521.41	40.7	38,132	27,196	71.3	18,219	10,255	56.3
California	40	386.69	267.72	69.2	15,287	12,635	82.7	4,526	3,287	72.6
Oklahoma	20	247.46	95.56	38.6	9,937	5,094	51.3	2,519	1,054	41.8
Louisiana	26	327.03	122.01	37.3	9,331	3,927	42.1	5,224	1,956	37.4
Kansas	6	130.00	23.63	18.2	4,023	1,074	26.7	1,188	263	22.1
Illinois	6	85.89	36.64	42.7	2,683	1,455	54.2	766	297	38.8
Wyoming	6	109.20	30.62	28.0	3,078	1,160	37.7	1,645	385	23.4
New Mexico	5	104.95	35.59	33.9	2,473	924	37.4	1,363	350	25.7
Arkansas	3	31.17	10.69	34.3	1,390	726	52.2	418	107	25.6
Montana	2	21.73	6.44	29.6	679	356	52.4	429	261	60.8
Mississippi	3	43.06	9.76	22.7	986	411	41.7	480	179	37.2
N. Y.-Pa.	2	11.29	9.10	80.6	1,582	919	58.1	199	181	91.0
Colorado	1	59.32	28.30	47.7	805	366	45.5	406	148	36.5
North Dakota	1	13.42	10.41	77.6	318	250	78.6	281	219	77.9
Other states	0	78.03	0	0	2,900	0	0	728	0	0
Total U. S.	**196**	**2,929.77**	**1,207.88**	**41.2**	**93,604**	**56,493**	**60.4**	**38,391**	**18,942**	**49.3**

JOURNAL SURVEY OF PROVED RESERVES

Oil in sight—awaiting recovery

On these pages are the estimated proved remaining reserves of crude oil, condensate, and cycled products for the larger fields in the United States. Those major fields with an estimated ultimate recovery of 100 million barrels or more are flagged by asterisks and are included here regardless of present daily production. Fields included all produce 1,000 bbl. or more per day (in Texas, 3,000 bbl.); number of wells includes those producing oil or lease condensate. Figures in thousands of barrels. Figures under "Acreage" apply to largest reservoir only. All data as of January 1, 1957.

ARKANSAS

Field	1956 Prod.	Cum. Prod.	Est. Res.	No. Wells	Acres
Atlanta	431	16,573	3,427	39	1,500
Buckner	439	12,547	10,453	44	1,200
Cairo	416	4,600	13,400	19	700
Dorcheat-Macedonia	607	18,537	6,463	66	2,100
El Dorado, East	1,694	16,805	16,195	344	2,300
Falcon	414	1,618	4,382	73	700
Fouke	1,396	14,504	13,496	119	1,700
Horsehead	365	2,138	3,862	37	2,600
Kiblah	597	1,248	4,752	35	400
*Magnolia	3,615	86,375	28,625	114	4,100
McKamie	1,314	18,842	45,158	35	1,700
Midway	2,112	36,143	38,857	47	1,800
*Schuler & East & South	2,369	81,031	24,969	135	4,500
*Smackover	4,709	451,957	53,043	1,607	15,800
Stephens	1,117	28,028	16,972	491	2,800
Urbana	918	14,470	18,530	411	2,000
Village	815	17,648	6,352	89	3,000
Wesson	2,039	28,967	21,033	157	1,500

APPALACHIAN

*Alleghany	2,125	151,441	42,559		50,000
*Bradford	6,974	586,358	138,642		100,000

CALIFORNIA

Coastal Region

Aliso Canyon	2,600	26,997	28,003	124	1,100
Casmalia	529	18,890	6,110	59	1,500
Castaic Hills	573	5,258	5,742	56	500
Castaic Junction	1,636	6,075	16,925	42	900
*Cat Canyon, W.	4,896	82,035	52,965	276	3,000
Del Valle	745	19,705	8,295	79	650
*Elwood	1,207	97,245	12,755	42	500
Fillmore	834	1,399	8,601	10	100
Gato Ridge	968	23,574	11,426	43	500
Guadalupe	960	4,083	20,917	57	900
Honor Rancho	1,119	5,949	11,051	22	350
Lompoc	1,048	28,028	11,972	104	2,100
Montalvo, W.	1,326	4,106	15,894	32	700
Newhall-Potrero	3,475	42,556	37,444	123	1,200
Oak Canyon	453	7,636	4,364	23	300
Oakridge	807	4,083	9,917	41	450
*Orcutt	1,145	118,470	16,530	266	3,650
Oxnard	1,231	7,992	15,008	52	450
Placerita	1,596	26,738	18,262	336	700
Ramona	615	13,907	8,093	123	600
Rincon	3,090	58,799	31,201	246	1,550
*San Ardo	11,732	56,974	118,026	628	4,000
San Miguelito[1]	1,652	40,099	24,901	101	400
*Santa Maria Val.	2,716	123,732	36,268	393	6,400
Saticoy	1,062	1,147	13,853	23	600
Shiells Canyon	381	16,538	5,462	159	900
*South Mountain	5,004	59,533	55,467	402	2,300
Tapo Canyon, S.	428	2,760	3,240	22	250
Torrey Canyon	1,104	10,762	19,238	66	250
*Ventura	24,372	560,992	239,008	1,047	3,350
Zaca Creek	952	11,001	13,999	38	450

(1) Excludes D-7 and D-8 zones carried under Ventura field.

Los Angeles Basin

Bandini	747	1,380	8,620	47	120
Belmont Offshore	488	813	6,187	17	100
Beverly Hills	1,043	5,459	12,541	11	200
*Brea-Olinda	6,878	251,064	73,936	602	2,400
*Coyote, E.	2,148	74,455	25,545	282	1,250

CALIFORNIA (Continued)

Field	1956 Prod.	Cum. Prod.	Est. Res.	No. Wells	Acres
*Coyote, W.	2,329	186,201	38,799	330	1,000
*Dominguez	4,360	210,990	49,010	356	1,300
*Huntington Beach	22,536	592,016	207,984	1,765	5,350
*Inglewood	4,462	203,346	46,654	500	1,000
*Long Beach	7,772	799,182	75,818	1,212	1,300
*Montebello	1,504	165,843	14,157	318	1,250
Newport West	1,554	20,837	19,163	240	1,100
Playa del Rey	600	58,342	5,658	95	450
*Richfield	2,293	129,323	20,677	427	1,450
Rosecrans	1,202	75,532	14,468	222	600
Sansinena	3,762	17,577	42,423	152	600
*Santa Fe Springs	5,212	564,052	55,948	610	1,200
*Seal Beach	3,935	145,675	44,325	263	750
Sunset Beach	1,687	3,522	8,478	80	200
*Torrance	2,613	146,069	28,931	813	4,700
Whittier	510	23,726	6,274	132	650
*Wilmington	36,888	767,430	357,570	2,816	6,750
Yorba Linda	1,044	5,238	12,762	127	400

San Joaquin Valley

Antelope Hills	376	6,924	4,076	36	400
Belgian Anticline	4,254	18,900	31,100	138	1,200
*Belridge, North	549	63,501	6,499	84	1,900
*Belridge, South	3,764	66,912	43,088	1,085	7,650
*Buena Vista	7,756	455,844	94,156	1,030	4,600
*Coalinga, East	5,605	307,847	62,153	924	9,200
*Coalinga Nose	16,497	266,504	183,496	109	3,500
*Coalinga, West	2,430	180,517	29,483	838	12,000
*Coles Levee, North[1]	5,317	89,500	60,500	154	3,500
Coles Levee, South	884	16,553	8,447	37	3,300
*Cuyama, South	12,825	88,859	136,141	241	3,100
*Cymric	3,778	63,489	41,511	432	2,600
*Edison	4,557	72,238	47,762	740	5,600
*Elk Hills[2]	5,993	236,428	513,572	290	18,300
*Fruitvale	3,245	68,765	36,235	400	2,700
Gosford, East	445	4,712	4,288	23	500
*Greeley	4,277	73,497	46,503	57	1,900
Guijarral Hills	3,593	28,522	31,478	123	1,900
Helm	1,002	16,820	11,180	78	4,000
Jacalitos	445	16,981	5,019	106	2,450
Kern Bluff	382	4,415	3,585	131	550
*Kern Front	2,300	88,600	26,400	678	4,300
*Kern River	4,752	334,119	45,881	2,866	8,350
*Kettleman North Dome	5,166	412,808	62,192	278	13,100
Los Lobos	433	1,415	3,585	13	300
*Lost Hills	1,785	79,085	20,915	666	3,600
McDonald Anticline	491	2,691	4,309	50	500
*McKittrick	934	102,280	12,720	254	1,200
*Midway-Sunset	15,131	828,178	171,822	3,534	41,000
*Mount Poso	2,909	116,351	28,649	415	3,200
Mountain View	1,450	61,052	18,948	227	2,600
Paloma[1]	885	35,378	12,622	61	5,400
Premier	1,464	22,080	14,920	286	2,350
Pyramid Hills	705	3,544	6,456	190	1,000
Raisin City	2,158	20,248	19,752	130	1,400
*Rio Bravo	4,701	81,699	53,301	98	1,950
Riverdale	544	13,626	6,374	35	1,000
Rosedale	477	2,148	5,852	21	200
Rosedale Ranch	682	2,270	6,730	38	500
Round Mountain	1,088	46,070	11,930	180	1,000
Russell Ranch	2,930	43,623	41,377	157	1,300
Strand	1,561	7,526	17,474	28	450
Tejon-Grapevine	2,462	13,762	21,238	191	1,600
Tejon Hill	876	8,349	8,651	223	850
Ten Section	1,640	58,234	21,766	109	1,900
Wheeler Ridge	2,607	13,665	28,335	125	700

(1) Figures do not include condensate at Coles Levee, North, and Paloma. (2) Does not include 707 shut-in producers.

MICHIGAN

Field	1956 Prod.	Cum. Prod.	Est. Res.	No. Wells	Acres
Coldwater	912	17,143	7,857	64	3,200
Deep River	854	24,114	13,886	73	1,000
Eden	408	1,876	6,124	34	350
Kawkawlin	431	9,438	5,562	319	6,600
Norwich, East	395	5,042	1,958	94	4,200
Reed City	400	40,652	5,348	155	5,300
Reynolds	461	615	4,385	39	500
Rose City	378	3,064	2,936	108	4,500
West Branch	443	8,324	23,676	249	4,600

SOUTHEASTERN STATES

Alabama

Citronelle	1,751	1,786	48,214	51	2,000
Gilbertown & East	459	6,410	3,590	63	2,500
Pollard	834	3,762	6,238	36	1,500

Mississippi

Baxterville	5,958	56,085	38,915	179	3,400
Bolton	788	1,454	6,546	27	1,100
Brookhaven	3,239	43,324	31,676	141	6,000
Church Hill	855	3,453	6,547	33	1,450
*Cranfield	1,559	41,198	58,802	116	7,800
Eucutta	1,474	23,154	16,846	125	5,000
*Heidelberg	3,712	45,063	65,937	210	4,600
Idlewild	450	1,267	3,733	18	700
Kingston & North	574	4,491	5,509	28	600
LaGrange & South	2,148	29,059	20,941	136	1,300
Mallilieu	1,042	26,728	13,272	70	2,000
Maxie-Pistol Ridge	996	1,791	13,209	104	4,000
Overton	615	1,961	6,039	21	500
Pickens	519	17,297	7,703	37	2,250
Sibley	509	2,979	7,021	33	500
Soso	4,407	9,554	40,446	123	4,500
Sunnyiside	418	1,664	3,336	14	450
*Tinsley	4,487	145,540	54,460	313	9,600
Yellow Creek & West & North	1,495	12,677	12,323	133	3,500

Florida

Sunniland	485	4,821	3,179	11	400

TRISTATE AREA

Indiana

Griffin	2,449	40,349	9,651	599	6,000
Mount Vernon	567	7,898	4,102	159	1,700
Springfield	441	7,517	5,483	223	1,800
Union-Bowman	956	5,690	8,310	442	11,500
Welborn	398	3,469	2,531	113	1,300

Kentucky

Apex	818	1,461	6,539	281	3,000
Birk City	387	6,980	4,043	401	5,000
Dukes	644	701	7,299	122	1,400
High Bluff	383	450	4,550	68	1,000
Hitesville	473	8,957	3,043	190	2,500
Poole	849	14,207	5,793	499	5,000
Sebree	398	689	4,311	67	1,000
Smith Mills, North[1]	658	2,540	10,450	50	600
Uniontown	543	15,682	2,318	255	4,000

(1) Includes Indiana portion of pool.

Illinois

Albion	1,120	16,379	8,621	390	5,500
Allendale	721	9,087	5,913	381	7,700
Barnhill	411	4,115	2,885	67	1,600
Benton	1,032	33,169	8,831	237	3,500
Bourbon	459	459	5,541	49	1,000
Boyd	899	11,414	6,586	110	1,500
*Bridgeport (Lawrence)	4,352	261,559	23,441	3,628	30,000
Bungay	824	9,363	6,637	192	3,100
Centralia	546	39,583	4,417	560	3,400
*Clay City	9,210	187,768	37,232	3,431	85,000
Cooks Mills	1,341	1,370	13,630	174	3,000
Dale[1]	3,543	58,654	23,346	1,009	15,000
El Dorado	901	5,025	29,975	162	2,200
Ellery	389	2,836	4,164	144	2,600
Harco	522	523	3,477	34	800
Herald[2]	1,024	8,727	14,273	364	4,500

TRISTATE AREA (Continued)

Field	1956 Prod.	Cum. Prod.	Est. Res.	No. Wells	Acres
Inman, East	1,513	13,460	7,540	349	3,300
Inman, West	499	3,889	4,111	201	2,900
Iola	382	9,341	10,659	200	2,900
Johnsonville	1,063	30,518	7,482	374	8,900
Kincaid	1,037	1,283	6,717	34	800
*Loudon	9,828	197,845	102,155	2,067	23,200
Mattoon	639	12,241	3,759	410	5,100
Mount Carmel	711	10,915	9,085	376	4,500
*New Harmony	4,022	87,096	17,904	1,794	23,500
Phillipstown	1,168	16,336	8,664	393	5,700
*Robinson (Main)	2,621	171,365	18,635	6,692	37,500
Roland[3]	2,503	30,872	12,128	618	8,600
St. James	416	13,791	2,209	163	1,900
Sailor Springs[4]	1,794	27,579	14,421	744	13,000
*Salem	6,606	252,334	97,666	2,373	14,400
Woburn	598	2,453	4,547	86	1,500
Woodlawn	365	14,285	1,715	144	2,000

(1) Dale includes Cantrell, North Cantrell, and Flanagan, consolidated 1956. (2) Herald includes South Concord, consolidated 1956. (3) Roland includes Iron pool, consolidated 1956. (4) Sailor Springs includes Flora, consolidated 1956.

LOUISIANA

North Louisiana

Bee Brake	410	1,001	3,999	25	1,800
Bellevue	401	15,485	6,515	354	2,500
Benton	958	11,193	6,807	13	2,300
Bethany, South	747	892	7,108	61	2,400
*Caddo	8,471	231,240	168,760	5,234	76,000
Catahoula Lake, West	643	4,469	5,531	49	1,700
Colquitt	912	1,622	8,378	23	1,800
Cottage Grove	501	1,037	4,963	45	1,100
*Cotton Valley	4,273	88,477	26,523	284	9,600
*Delhi-Big Creek	6,764	87,218	137,782	334	11,400
De Soto	370	64,670	11,330	227	9,000
Esperance Point	1,711	4,900	9,100	33	4,500
*Haynesville[1]	1,865	127,764	27,236	387	13,700
Haynesville, East	1,094	12,311	12,689	133	7,100
*Homer	753	84,418	15,582	322	3,000
Knowles	1,146	9,591	6,409	42	1,700
*Lake St. John	3,259	65,856	46,144	143	11,400
Lisbon	1,244	30,725	31,275	302	14,000
Locust Ridge	723	951	5,049	15	700
Nebo	1,842	39,470	20,530	168	7,000
Olla	1,281	39,782	15,218	162	8,100
*Rodessa[2]	1,566	120,695	64,305	519	38,000
Rodney Island	404	466	4,534	12	600
Ross Bayou	516	1,708	5,292	20	800
Ruston	451	3,524	4,476	19	800
Saline Lake	414	4,058	3,942	21	1,900
Shongaloo- N.-Red Rock	581	2,302	7,698	64	2,000
Sligo	976	12,344	5,656	82	2,300
Springhill[1]	414	3,352	4,648	77	2,800
Urania	813	37,492	7,508	274	5,500
Waskom-Greenwood	966	3,905	11,095	216	4,500

(1) Includes Arkansas portion. (2) Includes Arkansas and Texas portions.

South Louisiana

Anse La Butte	1,850	36,378	18,622	112	1,200
Avery Island	3,311	30,475	44,525	90	850
Avondale	470	3,790	6,210	15	500
Bancroft & N. & S.	669	11,981	16,019	25	1,060
Barataria	561	21,259	11,741	24	720
Barataria, West	526	10,912	10,088	18	720
Bateman Lake	2,513	15,254	34,746	50	880
Bay de Chene	1,617	10,020	21,980	48	1,600
Bay St. Elaine	3,198	26,541	36,459	89	1,200
Bayou Blue	927	14,011	6,989	73	700
Bayou Choctaw	1,201	10,702	12,298	58	800
Bayou Couba	840	6,343	9,657	41	600
Bayou des Allemands	837	8,876	6,124	30	800
Bayou Mallet & S.	983	11,682	13,318	64	1,500
*Bayou Sale	2,827	56,533	45,467	81	3,400
Bayou Sorrel	810	1,062	13,928	25	1,000
Bayou White	561	2,506	9,494	20	600
Big Lake	852	1,890	10,110	20	1,700
Black Bayou	600	21,422	16,578	33	1,030
Bosco	592	34,997	11,003	34	1,340
Bully Camp	1,630	10,390	18,610	58	590
*Caillou Island	9,849	105,512	124,488	245	3,120
Cankton, North	1,027	9,269	20,731	68	2,000
Chacahoula	716	23,645	8,355	41	960
Charenton	1,440	27,604	22,396	154	1,436
Clear Creek	788	1,771	32,229	57	2,280

Field	1956 Prod.	Cum. Prod.	Est. Res.	No. Wells	Acres
Clovelly	1,080	3,536	18,464	27	640
Cote Blanche Island	688	1,801	6,199	12	360
Cote Blanche Bay, W.	1,882	24,398	25,602	63	2,520
Cowpen Creek	428	766	16,234	27	810
Cox Bay	2,781	15,226	27,774	68	2,180
Crowley, North	1,169	28,169	16,831	61	2,440
David Haas	566	7,818	7,182	21	400
Delacroix Island	721	7,609	5,391	21	940
Delta Duck Club	882	8,751	11,249	29	1,040
*Delta Farms	3,865	71,580	38,420	108	4,160
Delta Farms, West	607	2,790	15,210	15	600
DeQuincy	409	4,039	7,961	20	600
Dog Lake	947	14,807	10,193	36	1,100
Duck Lake	2,833	17,105	30,895	80	2,320
Egan	2,486	24,751	14,249	64	2,200
Ellis	769	2,142	13,858	26	360
*Erath	3,291	66,807	58,193	40	2,000
Fausse Point	1,508	8,004	21,996	49	1,230
Fordoche	754	6,418	15,582	36	1,420
Franklin	779	1,310	10,690	20	800
Garden Island Bay	1,317	25,581	18,419	72	850
Gibson & East & N.E.	903	33,402	11,598	57	1,710
Gillis-English Bayou	714	26,944	15,006	40	2,000
*Golden Meadow	3,489	65,013	44,987	254	2,880
Good Hope	1,094	21,991	16,009	35	840
*Grand Bay	4,028	53,802	50,198	133	3,050
Grand Lake	716	14,086	7,914	35	720
Gueydan & West	1,036	28,807	13,193	57	800
Hackberry, East	958	47,176	20,284	73	1,390
*Hackberry, West	4,545	49,795	52,205	140	1,180
Horseshoe Bayou	820	14,291	17,709	23	1,000
Hurricane Creek	501	4,683	16,317	35	1,400
*Iowa	2,079	83,563	43,437	109	1,500
Jeanerette, South	1,124	22,335	11,665	56	1,850
*Jennings	1,020	107,248	22,752	108	1,180
Kent Bayou	620	1,988	8,012	16	640
Kinder	922	1,689	22,311	39	1,160
*Lafitte	2,850	88,565	39,435	91	2,910
Lake Barre	1,677	24,226	16,774	56	990
Lake Chicot	982	14,259	8,741	28	840
Lake Mongoulois	756	7,921	11,079	24	800
Lake Palourde, East	587	1,257	7,743	11	440
Lake Pelto	2,575	26,773	25,227	77	1,620
Lake Salvador	1,335	24,111	28,889	37	1,160
Lake Verret, West	1,341	21,113	18,887	59	2,360
*Lake Washington	7,533	20,548	129,452	214	4,400
La Pice	812	11,317	16,683	34	720
La Rose	1,069	1,691	15,309	23	920
*Leeville	4,029	56,928	45,072	154	3,000
Little Lake	2,275	7,132	40,868	51	2,040
Lockport	906	22,566	21,434	73	1,220
Napoleonville	642	4,347	14,653	31	960
New Iberia	813	48,729	9,271	61	2,440
Paradis	2,790	54,068	29,932	83	3,400
Phoenix Lake	1,318	8,677	12,323	46	1,240
Pine Prairie	921	19,419	9,581	71	1,720
Pointe-a-la-Hache	1,980	16,267	21,733	63	2,560
Port Barre	862	28,081	15,919	73	1,120
Potash	572	9,012	5,988	20	760
*Quarantine Bay	3,850	53,325	68,675	123	4,060
Raceland	516	11,179	7,821	18	620
Roanoke	577	18,456	5,544	24	1,520
Romere Pass	3,493	23,117	34,883	78	3,780
St. Gabriel	828	24,781	15,219	51	800
Section 28 Dome	1,399	11,712	25,288	61	1,410
Shuteston	982	9,142	20,858	49	1,000
Southeast Pass	453	1,510	4,490	13	720
Sunshine	458	5,586	8,414	22	880
Sweet Bay Lake	466	902	10,098	18	720
Sweet Lake	556	12,884	7,116	24	480
Tepetate	488	20,063	4,937	37	1,240
Tepetate, North	484	9,246	18,754	47	1,880
Tepetate, West	381	16,862	4,138	27	1,630
*Timbalier Bay	5,301	16,592	90,408	178	2,960
University	934	39,711	16,289	54	1,880
Valentine	1,826	15,238	32,762	80	1,280
*Venice	4,919	66,390	66,610	133	2,300
Ville Platte	1,176	55,751	17,249	122	5,560
*Vinton	2,171	86,493	43,507	153	1,560
*Weeks Island	8,474	66,549	125,541	159	2,760
West Bay	3,358	31,500	43,500	124	3,280
White Castle	760	24,302	12,698	35	720
White Lake, East	1,344	18,113	29,887	53	2,120
White Lake, West	763	3,866	12,134	27	1,080

Offshore Louisiana

Bay Marchand[1]	3,423	17,189	67,811	87	3,480
Belle Isle[1]	483	3,042	17,958	21	840
Breton Sound Blk. 20	442	1,349	8,651	10	400
Eugene Island:					
Blk. 18 & 32	1,365	5,007	19,993	25	1,000
Blk. 126	2,623	7,382	49,618	52	2,080
Blk. 128	384	466	8,534	9	360
Grand Isle:					
Blk. 18	1,592	5,409	20,591	26	1,040
Main Pass:					
Blk. 35	3,812	13,296	76,704	74	2,960
*Blk. 69	4,574	16,666	102,334	93	3,720
Ship Soal Blk. 154	417	460	14,540	15	600
South Pass:					
*Blk. 24[1]	16,362	33,489	278,511	312	4,160
Blk. 27	1,535	2,292	25,708	28	1,120
West Delta:					
Blk. 30	1,350	1,640	33,360	35	1,400
Blk. 53	656	1,759	9,241	11	440

(1) Includes onshore production.

KANSAS

Augusta	366	47,694	4,306	180	5,900
Barry	572	8,259	5,741	68	1,700
*Bemis-Shutts	3,076	84,772	27,228	578	15,600
Bloomer	1,268	47,236	17,764	279	5,600
Boyd	644	7,775	4,225	134	3,900
Browning	401	7,871	3,129	96	1,600
Burnett	2,230	51,662	18,338	291	7,500
Burnett, Southwest	443	5,199	2,801	83	1,600
Burrton-Haury	695	50,246	6,754	330	11,200
Carroll	413	3,266	5,734	73	2,500
*Chase-Silica	4,689	190,083	59,917	1,296	58,600
Chitwood	418	8,484	4,516	69	2,500
Cooper	936	5,752	8,248	135	5,000
David	514	3,437	4,563	165	1,850
Demalorie-Sowder	702	14,393	5,607	141	2,200
Dieboldt	795	1,625	4,375	99	2,100
Dopita	365	2,200	4,800	70	3,600
*El Dorado	4,348	227,704	47,296	1,721	22,500
Fairport	964	27,742	8,258	215	5,000
Fort Zarah	542	3,998	3,002	106	3,200
Fox-Bush	729	20,518	6,482	121	4,500
Garfield	1,888	2,956	19,044	227	8,000
Gates[1]	877	8,559	7,441	146	6,300
Geneseo-Edwards	2,734	58,604	27,396	437	10,600
Gibson	407	2,447	2,553	97	1,700
Gladys	1,885	22,896	8,104	225	4,200
Gorham	1,543	60,621	24,379	431	15,800
Graber	433	13,041	4,959	111	3,850
*Hall-Gurney	3,587	72,914	34,086	1,249	29,600
Harper Ranch	488	1,005	3,995	33	1,200
Holley	655	880	5,120	94	2,000
Iuka-Carmi	1,486	18,109	13,891	246	9,000
Jelinek	602	4,442	5,558	83	2,700
*Kraft-Prusa	3,498	77,604	42,396	694	27,000
Larned	606	2,067	3,933	69	2,600
Lost Springs	601	10,966	4,034	234	7,900
Madison	719	10,121	4,879	109	3,600
Marcotte	1,621	12,845	12,155	278	6,400
Max	482	7,077	3,923	86	1,800
Medicine Lodge-Boggs[2]	471	3,302	2,698	48	2,800
Morel	1,461	21,241	12,759	213	7,000
Mueller	560	7,306	5,694	108	4,600
Murphy[3]	1,096	3,378	9,622	169	3,000
Northampton	442	3,576	2,424	57	1,500
Norton	876	2,573	7,427	117	2,200
Ogallah	596	3,015	3,985	77	3,800
Otis-Albert	710	11,240	4,760	184	13,200
Ray	1,225	19,773	10,227	152	4,350
Rhodes	994	3,478	10,522	143	5,500
Richardson	398	13,536	3,464	65	1,600
Ritz-Canton	1,248	46,889	9,111	324	14,000
Russell	722	15,991	5,009	186	5,300
Sallyards	620	13,701	3,299	167	2,500
Seeley-Wick	1,341	25,167	9,833	310	4,600
Solomon	555	3,357	3,643	97	3,500
Spivey-Grabs[4]	1,696	3,289	16,711	248	15,500
Stoltenberg	951	39,236	9,764	317	13,000
Thrall-Agard	748	30,618	11,382	305	3,700
*Trapp	4,427	158,231	51,769	1,266	37,800
Vernon, North	488	1,921	4,079	85	1,800
Walters	795	9,819	5,181	127	4,200
Welch-Bornholdt	1,108	27,609	11,391	369	9,500
White, Southwest	517	979	4,021	62	1,500
E. Kansas Stripper	6,929	231,524	70,476	8,100	.....

(1) Gates includes Marie, Fisher & Fisher, Northwest, consolidated 1956. (2) Medicine Lodge-Boggs consolidated 1956. (3) Murphy includes Hilltop pool, consolidated 1956. (4) Spivey-Grabs includes these pools, all consolidated in 1956: Grabs, South Grabs, Northwest Grabs, Rago, Rochester, Spivey, Northwest Spivey, Southeast Spivey, West Spivey, and Zenda.

OKLAHOMA

Field	1956 Prod.	Cum. Prod.	Est. Res.	No. Wells	Acres
*Allen	1,638	81,803	18,197	824	8,500
Atlantic	554	8,213	5,787	137	1,000
*Avant	341	102,470	4,530	593	12,500
Bald Hill	978	54,398	8,602	714	33,000
Barker	455	1,188	3,812	58	1,500
Bebee	745	29,225	7,775	480	10,300
Bird Creek	373	74,915	3,085	1,001	31,000
*Bowlegs	685	137,129	12,871	192	5,000
Bradley	3,169	5,812	14,188	160	5,300
Bradley, N.	410	604	4,396	13	500
Bradley, N.E.	389	1,349	4,651	10	300
*Burbank	13,519	319,669	86,331	2,543	5,000
Cache Creek	661	13,683	4,317	289	3,000
Caddo	389	2,208	5,792	65	650
*Cement	4,372	84,565	40,435	1,217	15,000
Ceres, South	631	5,600	4,400	143	1,450
Chandler[1]	472	17,980	5,020	127	4,500
Chickasha	1,004	2,090	9,910	229	2,500
Chitwood	466	6,294	3,706	31	1,250
Clothier, Southwest	457	2,591	6,409	37	600
Conservation	518	4,123	3,877	255	5,400
Cromwell	416	66,310	5,690	189	6,000
Cumberland	1,944	51,366	23,634	140	1,800
*Cushing	2,549	402,842	52,158	1,824	28,000
Davenport	1,338	21,930	12,070	302	3,400
Dilworth	921	16,242	16,758	377	9,500
Dora	477	8,139	4,861	114	2,400
Doyle	3,056	19,446	22,554	304	3,200
*Earlsboro	318	134,612	5,388	97	7,500
Edmond	462	25,981	5,019	87	1,000
*Edmond, West	1,483	105,966	24,034	624	32,000
*Elk City	5,326	43,569	76,431	307	7,700
Eola	3,566	12,410	53,580	88	3,500
Fish	391	23,014	3,986	100	2,600
*Fitts	785	113,433	11,567	449	5,000
Flat Rock	859	44,736	15,264	564	8,000
Garber	862	63,271	6,729	495	6,400
*Glennpool	1,901	253,927	36,073	1,810	24,000
*Golden Trend[2]	20,204	136,147	163,853	1,931	7,700
Hallett	438	1,532	4,468	81	2,800
Hawkins, Northwest	377	3,565	4,435	184	2,500
*Healdton	2,347	226,946	23,054	2,048	9,300
*Hewitt	3,495	148,679	36,321	1,449	15,000
Holdenville	1,117	14,253	13,747	532	6,000
Hoover, North	2,063	12,326	18,674	448	4,500
Iron Post	887	12,075	7,925	383	10,000
Jones	849	5,358	7,642	123	3,400
Kellyville	372	4,892	3,108	279	4,300
Knox	1,291	32,199	16,801	399	5,500
Lauderdale	589	17,789	6,211	249	5,000
Lindsay, N.	434	9,297	3,703	77	3,100
Lindsay, N.W.	542	1,466	4,534	18	750
Little River	571	128,683	6,317	162	5,600
Loco	1,606	17,203	17,797	837	8,000
Lucien	951	42,352	9,648	191	5,200
Madill, N.	798	934	9,066	62	2,500
Mannford	868	10,542	9,458	434	7,000
Meramec	371	5,960	4,040	176	3,000
Mount Vernon	535	2,422	7,578	69	1,200
Mount Vernon, S.W.	893	1,590	8,410	114	1,500
Naval Reserve	1,102	28,076	10,924	429	6,000
Norfolk, West	484	2,632	5,368	79	2,300
*Oklahoma City	3,743	703,976	66,024	571	14,300
Olympic	1,752	30,882	8,118	327	4,500
Pauls Valley	597	22,360	5,640	82	2,000
Payson	786	5,025	8,975	189	2,300
Peavine	739	5,447	4,553	67	2,000
Pond Creek	474	2,237	4,763	187	3,000
Ringwood	484	8,543	6,457	238	2,400
Robberson	398	19,988	3,012	232	4,500
*Seminole	827	161,218	13,782	286	10,750
Short Junction	2,607	3,073	26,927	170	10,000
*Sho-Vel-Tum	29,717	444,299	355,701	6,661	64,000
Slick	713	39,441	8,551	254	8,500
Stroud	624	23,063	6,937	416	4,000
*St. Louis	1,486	183,523	17,477	473	22,200
*Tonkawa	255	126,221	3,779	92	5,000
Tryon, N.W.	516	1,756	4,244	40	500
Walters	414	30,276	3,724	318	4,100
Wewoka	538	51,919	6,081	262	2,500
Whitetail[3]	1,057	1,495	10,505	194	1,500
Wildhorse	961	19,634	6,366	418	4,700
Witcher	378	11,414	4,586	172	6,600

OKLAHOMA (Continued)

Field	1956 Prod.	Cum. Prod.	Est. Res.	No. Wells	Acres
Yale-Quay	1,322	38,431	12,569	319	1,000
N.E. Stripper Area	11,358	447,160	127,840	12,743	

(1) Chandler includes Hoyt, consolidated 1956. (2) Golden Trend includes following pools, consolidated 1956: Foster East, North, and Northeast; Purdy Northwest and Southeast. (3) Whitetail includes South Whitetail, consolidated 1956.

NEW MEXICO

Anderson Ranch	1,287	3,337	18,663	21	1,900
Arrowhead	560	21,638	8,362	107	5,100
Artesia	702	10,037	9,963	330	11,000
Bagley	1,614	12,383	20,617	38	1,700
Bronco	864	2,228	27,772	14	400
Brunson	1,193	24,009	25,991	117	6,100
*Caprock & East	6,942	20,956	79,044	594	23,000
Caudill Devonian	1,488	2,265	17,735	17	750
Cooper-Jal & Jal Mat[1]	1,872	35,164	54,836	315	17,300
Crossroads	1,358	7,548	17,452	22	520
Dean	1,273	1,324	23,676	22	900
*Denton	10,778	47,124	77,876	211	4,500
Dollarhide, West	3,027	12,287	27,713	169	2,900
Drinkard	2,054	42,809	32,191	466	19,250
*Eunice-Monument[2]	10,527	275,041	102,959	1,241	49,300
Echols & North	655	2,805	7,195	10	450
Fowler	847	4,390	10,610	19	1,100
Gladiola	1,605	6,914	20,086	39	900
Grayburg-Jackson	945	33,693	15,307	382	15,000
Hare	973	10,630	18,370	83	3,450
*Hobbs	3,401	153,283	42,717	284	11,300
Langlie-Mattix	2,046	39,436	23,564	693	26,000
Lazy J. Penn	384	2,131	7,869	27	1,400
Loco Hills	463	16,450	8,550	212	9,600
Lovington & East	3,080	25,708	29,292	239	3,600
Maljamar	2,277	33,044	18,956	304	12,500
Moore	1,235	4,705	15,295	20	800
Paddock	478	11,012	8,988	100	4,500
Saunders & South	1,727	10,350	17,650	55	2,400
Terry Blinebry	1,096	2,343	17,657	84	2,500
Townsend Wolfcamp	2,985	7,249	42,751	85	2,500
*Vacuum	3,944	77,939	47,061	468	18,700
Warren & North	1,473	7,315	12,685	37	900
Wilson & North & South	431	7,529	7,471	53	2,100

(1) Includes Eaves, and Monument pools. (2) Includes Eumont, Eunice, S. Eunice,

ROCKY MOUNTAIN STATES

Utah

Aneth	492	492	79,508	24	8,000
Ashley Valley	837	7,271	5,729	29	800
Red Wash	724	3,009	22,991	21	10,000

Western Nebraska

Doran	371	1,381	5,619	18	1,000
Dorman	426	2,091	1,909	24	750
Enders	377	2,329	5,671	30	700
Hafeman, South	402	509	1,491	18	400
Harrisburg	762	3,126	11,874	59	1,800
Lodgepole	1,098	1,571	5,429	44	1,000
Long	636	2,863	4,137	62	1,100
Lovercheck	382	382	1,618	13	200
Malley	758	1,545	3,455	17	400
Olsen	1,251	1,376	6,624	36	800
Torgeson	552	1,333	4,667	40	850
Travis	1,011	1,388	5,612	28	850
Vedene	497	497	2,503	19	400

Colorado

Adena	5,709	16,327	33,673	188	11,000
Badger Creek	518	2,725	5,275	49	500
Big Beaver	876	1,844	8,156	24	900
Black Hollow	676	2,030	6,970	17	1,000
Bobcat	884	2,568	5,432	32	1,400
Cliff	979	1,887	5,113	30	1,200
Divide-Springdale	405	1,487	6,513	31	1,350
Graylin	1,051	5,152	11,848	66	2,000

Field	1956 Prod.	Cum. Prod.	Est. Res.	No. Wells	Acres
Jackpot	514	761	5,239	36	450
Kejr	603	730	5,270	33	1,350
Lewis Creek	456	2,051	2,949	15	600
Little Beaver Creek	1,257	7,698	15,302	88	1,600
Little Beaver, East	736	1,237	7,763	25	900
McCallum	377	2,006	3,994	12	600
Mount Hope	840	4,559	10,441	75	1,100
Plum Bush Creek	1,232	1,992	8,008	39	1,500
Powder Wash	378	2,077	3,923	29	3,000
*Rangely	28,302	217,820	148,180	519	19,200
Sand River	483	1,218	4,782	23	1,000
Wilson Creek	2,556	34,620	25,380	40	3,900
Yenter	647	5,179	7,821	31	1,450

Montana

Cabin Creek	1,631	2,502	32,498	29	3,000
*Cut Bank	2,680	83,599	27,401	1,259	54,000
Elk Basin		(See Wyoming)			
Glendive	541	2,605	10,395	14	1,000
Kevin-Sunburst	1,021	62,485	9,515	1,643	20,000
Pine Unit	3,828	5,442	38,558	79	8,400
Pondera	674	12,930	8,070	323	4,300
*Poplar, East	3,763	11,289	233,711	86	18,000
Sumatra & N.W.	1,447	4,202	15,798	59	2,300
Wolf Springs	418	436	9,564	24	5,000

North Dakota

*Beaver Lodge-Tioga[1]	10,413	31,188	218,812	551	40,000
Blue Butte	382	392	14,608	34	3,000
Charlson	1,334	2,359	28,641	77	6,000

(1) Beaver Lodge, Tioga, Tioga East, Capa, and Hofflund fields were consolidated in 1956.

Wyoming

Ash Creek & South[1]	1,346	3,221	11,779	47	1,800
Beaver Creek	2,448	6,456	33,544	37	1,350
Big Muddy	1,297	39,251	15,749	271	2,900
Big Sand Draw	2,530	23,483	31,517	17	1,000
Bonanza	5,241	18,772	52,228	52	1,000
Byron	2,616	37,771	22,229	64	2,400
Circle Ridge	968	8,835	11,165	111	800
Clareton	2,297	12,757	25,243	689	30,000
Cole Creek & South	1,082	14,646	10,354	90	4,700
Cottonwood	1,556	1,650	25,350	29	1,200
Crooks Gap	649	7,670	5,330	7	300
Dugout Creek	432	2,232	7,768	26	1,050
*Elk Basin[1]	11,143	109,980	190,020	289	5,000
Elk Basin, South	718	5,359	6,641	22	500
Frannie[1]	3,039	40,608	15,392	126	1,600
Garland	5,281	40,240	19,760	112	3,300
Gebo	1,333	8,078	6,922	40	600
Glenrock	4,121	21,032	28,968	206	7,000
Golden Eagle	1,184	4,522	5,478	10	500
*Grass Creek	4,132	59,750	40,250	391	5,900
Grieve	790	981	9,019	18	1,000
Hamilton Dome	5,418	44,129	35,871	147	2,400
Happy Springs	1,151	4,371	10,629	26	200
La Barge	405	14,421	2,579	163	900
*Lance Creek	1,090	95,882	24,118	223	2,500
Little Buffalo Basin	1,156	11,385	5,615	31	1,400
*Lost Soldier	3,974	66,868	33,132	64	1,100
Manderson	688	1,232	8,768	21	4,000
Meadow Creek & North	2,824	13,981	22,019	178	4,300
Murphy Dome	1,635	4,843	10,157	14	160
Mush Creek Area	1,185	22,409	19,591	649	6,000
*Oregon Basin N. & S.	5,979	77,296	42,704	209	8,300
Pilot Butte	480	6,649	3,351	38	390
Pitchfork	368	2,223	2,777	9	200
Rock River	424	31,108	3,892	29	1,000
Sage Spring Creek	601	4,281	5,719	26	2,000
*Salt Creek	4,302	364,813	55,187	1,282	21,500
Slick Creek	387	933	3,067	8	2,900
Steamboat Butte	3,390	33,904	20,096	43	1,600
Sussex & West	3,901	17,654	19,346	139	3,500
Teapot	371	4,526	5,474	19	3,000
Wertz	2,325	32,262	17,738	29	700
Winkleman Dome	1,809	10,845	12,155	25	600
Worland	481	13,430	9,570	32	6,400

(1) Includes Montana portion of field.

TEXAS

Field	1956 Prod.	Cum. Prod.	Est. Res.	No. Wells	Acres
Southwest Texas					
RAILROAD DIST. 1:					
Big Foot	2,208	10,344	34,656	524	8,700
Charlotte	1,230	16,356	20,644	293	6,100
Crown, East	1,762	2,346	20,654	317	7,000
*Darst Creek	3,356	94,541	40,459	499	2,000
*Luling-Branyon	2,824	106,570	30,430	780	3,900
RAILROAD DIST. 4:					
*Agua Dulce (& Stratton)	7,055	134,566	90,434	453	9,800
Borregas	3,497	13,598	36,402	176	3,000
Fulton Beach	2,517	16,761	38,239	269	6,000
Hoffman	1,426	29,918	15,082	437	5,600
Kelsey & South	3,699	32,778	39,222	431	2,800
*La Gloria	3,997	63,175	86,825	164	3,000
Mustang Island	2,592	14,379	26,621	138	1,500
*Plymouth & East	5,816	94,741	65,259	297	4,000
Portilla	3,343	25,081	64,919	126	1,650
Rincon & North & South & West	2,428	43,303	26,697	251	3,400
*Seeligson (all zones)	9,604	152,979	147,021	650	9,900
Sun & East & North	1,388	21,707	18,293	193	2,000
Tijerina-Canales-Blucher	2,567	34,114	50,886	220	2,900
*White Point, East	3,469	62,294	47,706	367	3,700
Willamer & West & North	2,431	38,012	36,988	256	4,000
Texas Gulf Coast					
RAILROAD DIST. 2:					
Bloomington	1,273	15,065	22,935	116	1,600
Burnell-Tulsita	3,113	30,530	34,470	131	1,500
Francitas, North	1,571	13,467	16,533	66	1,600
*Greta & West	2,361	72,209	37,791	200	2,800
Helen Gohlke & West	2,060	12,520	37,480	154	3,000
Lolita	1,451	28,757	15,243	228	2,600
Mary Ellen O'Connor	2,292	4,872	45,128	163	4,900
McFaddin	1,172	23,318	15,682	65	1,000
Placedo & East	1,738	42,563	23,437	215	4,800
*Refugio & North & Fox	2,002	76,144	73,856	221	8,000
*Tom O'Connor	9,461	224,494	225,506	653	7,200
*West Ranch	6,279	103,021	146,979	651	10,200
RAILROAD DIST. 3:					
Amelia	1,101	25,124	19,876	127	1,650
*Anahuac	4,900	137,347	128,653	306	6,700
*Barber's Hill	1,959	104,758	25,242	160	1,700
Boling & South	1,579	29,857	50,143	204	5,000
*Chocolate Bayou	4,050	56,478	50,522	119	2,500
*Conroe & West	9,774	362,134	237,866	791	11,600
Esperson Dome	1,043	12,318	22,682	95	1,000
Fairbanks & N. & S.	1,341	37,447	22,553	235	3,500
Fannett	1,166	29,443	16,557	67	1,800
Gillock & E. & S.	3,426	33,889	56,111	194	2,000
*Goose Creek & East	2,896	96,533	40,467	332	4,000
*Hastings	11,410	276,109	223,891	635	5,300
*High Island	3,542	46,062	53,938	152	4,300
Houston, South	1,279	27,648	15,352	90	1,300
*Hull-Merchant	6,058	136,696	110,304	472	14,000
*Humble Dome	1,128	133,014	31,986	334	3,000
*Katy, North	9,353	96,464	98,536	94	3,000
Lake Creek	1,014	29,853	11,147	35	7,300
Liberty, South	3,410	34,242	55,758	262	8,000
Livingston	1,066	25,090	19,910	128	2,300
*Magnet Withers & E.	1,466	36,304	68,696	217	15,500
Manvel	1,650	55,833	29,167	374	2,500
Markham, N.-Bay City, N.	1,631	15,136	22,864	191	5,300
*Old Ocean	5,822	97,889	99,111	163	2,500
Orange & North	1,852	41,624	23,376	218	2,500
Oyster Bayou	2,912	39,184	30,816	46	550
*Pierce Junction	5,339	64,515	85,485	314	7,000
Raccoon Bend	2,112	59,186	37,814	194	3,700
Saratoga & West	1,187	41,095	18,905	260	10,000
Sheridan	2,194	21,417	40,583	39	7,000
Silsbee & West	2,389	26,697	23,303	50	2,300
*Sour Lake	1,493	97,738	27,262	277	13,000
*Spindletop	393	134,237	15,763	77	900
Stowell	1,742	43,967	26,033	75	4,100
Sugar Valley	1,024	15,936	13,064	105	1,400

Field	1956 Prod.	Cum. Prod.	Est. Res.	No. Wells	Acres
*Thompson & N. & S.	9,032	213,154	131,846	335	5,600
Tomball	1,762	57,458	24,542	377	6,000
Village Mills, East	2,405	19,557	30,443	146	1,800
*Webster	10,508	222,617	227,383	202	2,600
*West Columbia & New	2,196	122,977	27,023	185	6,500
Withers, North	1,496	31,520	28,480	145	5,000

East Texas

RAILROAD DIST. 5:

Corsicana Shallow	1,223	19,194	20,806	1,554	9,200
*Powell	224	126,054	3,946	118	2,650
*Van	5,824	265,422	139,578	657	5,900

RAILROAD DIST. 6:

Carthage	1,029	23,166	21,834	94	35,000
*East Texas	64,838	3,224,691	1,885,309	19,902	135,500
*Hawkins	12,025	212,108	312,892	611	12,500
Haynes	1,162	1,461	23,539	101	4,000
*Neches	2,601	7,009	92,991	266	6,200
New Hope	1,664	24,257	28,743	66	2,000
Quitman	1,630	34,455	25,545	167	4,700
Rodessa (see North Louisiana)					
*Talco	3,639	156,420	73,580	679	8,900

North and West Central Texas

RAILROAD DIST. 7-B:

Fisher County:					
Claytonville	1,034	4,217	15,783	47	1,700
Round Top	1,485	14,511	15,489	191	3,500
Nolan County:					
Dora, N.	1,199	2,522	22,478	69	1,400
Hylton, N.W.	1,498	3,581	21,419	84	3,000
Lake Trammel, W.	1,155	2,221	22,779	70	2,800
White Flat	1,132	4,339	15,661	78	3,100
Stonewall County:					
Boyd	1,205	4,690	30,310	126	4,800
Flowers	2,198	7,155	32,845	217	3,500
Katz (see Dist. 9)					
Old Glory	1,025	5,789	19,211	107	3,800

RAILROAD DIST. 9:

Archer County:					
Hull-Silk-Sikes	1,819	50,314	29,586	448	9,000
Cooke County:					
Walnut Bend	3,321	43,298	46,702	203	4,000
Grayson County:					
Big Mineral Creek	2,121	6,097	28,903	141	1,500
Sadler, West	1,034	1,952	12,048	75	1,200
Sherman & East	3,557	15,359	54,641	333	3,500
Knox-King-Stonewall County:					
Katz	3,016	10,823	39,177	209	8,000
Wichita County:					
*Burkburnett	2,370	184,279	69,721	1,574	8,000
*Electra	2,164	178,123	37,877	2,867	14,000
*K.M.A.	3,634	107,735	77,265	1,597	31,000
Wilbarger County:					
Fargo	1,360	13,421	19,579	145	3,600
Young County:					
Langston-Kleiner	1,072	4,294	14,706	212	2,400

West Texas

RAILROAD DIST. 7-C:

Amacker-Tippett	1,108	2,290	17,710	27	1,480
Benedum	2,572	22,583	37,417	227	15,700
*Big Lake	798	115,153	16,847	164	6,000
Cree-Sykes	1,150	10,401	19,599	168	3,900
Fort Chadbourne	3,416	23,538	36,462	226	15,300
Hulldale	1,903	8,794	31,206	118	4,320
*Jameson	6,968	32,834	67,166	658	17,400
*McCamey	1,802	98,612	51,388	923	20,240
*Pegasus	5,215	31,889	115,111	254	19,200
*Spraberry Trend Area	21,100	138,236	261,764	2,666	106,000
Todd	2,456	37,108	32,892	114	2,600
Wilshire	2,172	17,588	42,412	45	3,360
World	1,739	23,752	24,248	204	4,450

RAILROAD DIST. 8:

Adair	2,201	17,396	22,604	171	4,680
Amrow	1,018	2,258	15,742	16	1,440

Field	1956 Prod.	Cum. Prod.	Est. Res.	No. Wells	Acres
*Andector	5,488	50,470	59,530	135	4,960
Andrews (Penn.)	943	1,619	18,381	45	2,000
Anton-Irish	2,772	22,420	25,580	190	7,460
*Block 31	5,739	36,925	83,075	84	5,400
Bronco	1,163	3,111	16,889	19	760
Cedar Lake	1,456	20,312	24,688	183	7,300
*Cogdell	6,861	47,102	87,898	429	15,000
*Cowden, North	5,968	125,436	94,564	869	28,500
*Cowden, S. (and Johnson & Foster)	10,666	139,393	160,607	1,272	30,000
Deep Rock	1,537	4,884	23,116	65	2,600
*Diamond-M	9,404	69,034	125,966	569	18,000
*Dollarhide	4,955	56,484	83,516	322	4,800
Dora Roberts	2,476	3,573	46,427	60	3,200
Dune	1,090	6,680	23,320	178	7,120
Embar	1,707	18,112	31,888	91	3,640
Emma & Triple N	3,848	18,411	60,589	149	6,000
Emperor	1,423	12,304	27,696	236	2,400
Fort Stockton	1,460	8,341	23,659	311	12,440
Foster (see Cowden, S.)					
Fuhrman-Mascho	3,782	25,820	54,180	475	15,000
*Fullerton & N. & S.	6,434	118,180	156,820	759	26,000
Garza	2,883	29,714	40,286	484	8,560
*Goldsmith (all fields)	18,647	219,875	280,125	2,473	30,760
Good	1,233	11,018	18,982	49	1,960
Harper	2,489	15,988	38,012	294	5,880
*Headlee	4,320	10,232	89,768	103	4,200
*Hendricks	1,375	227,157	24,843	219	10,610
*Howard Glasscock	7,308	186,302	100,698	1,265	18,400
Iatan, E. Howard	1,145	31,886	19,114	536	10,300
Johnson (see Cowden, S.)					
Jo-Mill	2,829	3,844	52,156	129	10,500
Jordan	3,341	48,666	48,334	404	5,200
*Kelly-Snyder	25,103	167,589	632,411	1,389	51,000
Kermit	3,887	50,476	39,524	499	13,800
*Keystone	7,505	145,890	208,110	907	11,320
Lea	1,531	3,732	21,268	72	2,240
*Levelland	8,826	92,796	126,204	2,061	84,500
Luther, S.E.	1,124	2,527	17,473	34	3,300
Mabee	1,045	12,763	12,237	105	5,500
Magutex	2,347	5,584	44,416	66	3,200
Martin	2,271	23,847	36,153	147	2,000
*McElroy	9,636	147,808	202,192	1,272	28,000
McFarland	2,292	2,527	37,473	194	7,760
*Means	5,120	31,755	98,245	589	26,900
*Midland Farms	6,105	44,134	65,866	348	15,000
Moore	1,104	2,820	22,180	219	6,300
Nolley	1,611	3,626	31,374	79	1,840
Oceanic-Penn.	1,131	3,671	16,329	48	1,880
Pecos Valley (all fields)	1,328	10,369	19,631	488	3,440
Penwell	1,722	40,211	24,789	253	5,900
*Prentice	5,918	19,428	90,572	384	7,040
Reinecke	1,531	14,657	22,343	70	2,800
Robertson	1,308	6,899	23,101	128	2,600
*Russell & N.	7,266	23,528	106,472	285	5,700
S-M-S	1,132	2,434	27,566	73	2,920
Salt Creek	4,068	20,661	59,339	117	8,400
*Sand Hills	6,788	22,465	107,535	703	14,640
*Seminole	4,410	89,068	90,932	356	13,440
Seminole, W.	1,207	7,470	22,530	76	3,040
Shafter Lake	3,537	41,435	53,565	457	8,200
Sharon Ridge	2,195	16,124	61,876	1,212	10,800
*Slaughter	11,104	232,788	208,212	2,536	85,240
Snyder	1,516	10,752	30,248	283	11,320
Spraberry Trend Area (see Dist. 7-C)					
*TXL	5,759	130,504	144,496	316	6,560
Three Bar	1,193	11,746	15,254	50	3,100
University Blk. 9	2,933	4,681	60,319	96	3,840
Vealmoor	1,534	12,279	62,721	78	3,240
Vealmoor, East	1,719	14,057	70,943	86	3,600
Virey	2,570	4,360	50,640	66	2,640
*Ward, South	4,462	64,526	60,474	929	10,000
*Ward-Estes, N.	5,440	61,394	81,606	1,223	12,200
War-San	1,279	2,364	27,636	27	1,200
*Wasson (and 66 & 72)	15,689	304,348	345,652	1,771	61,800
Welch	1,756	24,375	35,625	297	6,000
Wellman	1,030	8,099	16,901	30	2,430
Yarbrough & Allen	2,187	15,607	24,393	76	3,200
*Yates	9,690	440,706	259,294	648	21,000

Texas Panhandle

RAILROAD DIST. 10:

*Badger	2,953	85,908	37,092	1,229	49,000
*Borger-Pantex	3,673	131,837	53,163	932	37,000
*Finley	4,404	112,751	66,249	690	27,000
Quinduno	1,485	4,928	23,072	144	5,000
*West Pampa	3,651	119,217	40,783	1,155	46,000

World crude-oil production and reserves up, but . . .

Country—	Production (thou. bbl. daily) 1956 (partly est.)	1955	Per cent change	Est. crude-oil reserves (million of bbl.)	Ref. capacity (thou. bbl. per stream day)
W. Hemisphere:					
Argentina	83.1	83.6	—0.6	400.0	195.9
Bolivia	8.7	7.4	17.6	70.0	11.7
Brazil	11.0	5.5	100.0	40.0	111.3
Canada	464.9	354.7	31.1	3,500.0	751.0
Chile	9.6	7.1	35.2	25.0	20.0
Colombia	120.0	110.9	8.2	650.0	39.7
Cuba	1.6	1.0	60.0	4.0	8.7
Ecuador	9.7	9.7	0	25.0	5.6
Mexico	253.0	244.9	3.3	2,500.0	440.0
N.W.I.	0	0	0	0.0	650.0
Peru	49.8	47.2	5.5	275.0	46.2
Trinidad	79.0	68.2	15.8	285.0	137.0
Uruguay	0	0	0	0	28.0
Venezuela	2,450.0	2,157.2	13.6	13,200.0	605.3
Total	**3,540.4**	**3,097.4**	**14.3**	**20,974.0**	**3,050.4**
Middle East:					
Aden	0	0	0	0	120.0
Bahrain	30.0	30.0	0	205.0	205.0
Iran	538.0	328.9	63.5	30,000.0	538.3
Iraq	633.0	688.2	—8.0	22,000.0	46.8
Israel	0.6	0	....	50.0	85.0
Kuwait	987.0	1,092.6	—9.0	50,000.0	30.0
Lebanon	0	0	0	0	20.5
Neutral Zone	39.0	24.2	61.2	650.0	0
Qatar	127.0	115.0	10.4	1,500.0	0.6
Saudi Arabia	1,000.0	965.0	3.6	40,000.0	189.0
Total	**3,354.6**	**3,243.9**	**3.4**	**144,405.0**	**1,235.2**
Asia-Pacific:					
Australia	0	0	0	1.0	182.2
British Borneo	116.0	108.9	6.5	600.0	47.5
Burma	4.5	3.9	15.4	45.0	3.0
Formosa	0	0	0	0	28.0
India	9.2	7.0	31.4	400.0	73.7
Indonesia	257.0	238.6	7.7	5,000.0	229.8
Japan	6.0	6.1	—1.6	22.0	293.8
New Guinea	7.2	9.4	—23.4	50.0	0
Pakistan	5.1	6.0	—15.0	22.0	5.0
Philippines	0	0	0	0	13.0
Total	**405.0**	**379.9**	**6.6**	**6,140.0**	**876.0**
Western Europe and Africa:					
Algeria	0.6	1.2	—50.0	15.0	0
Austria	64.8	68.2	—5.0	395.0	45.2
Belgium	0	0	0	0	138.0
Denmark	0	0	0	0	1.0
Egypt	32.0	34.6	—7.5	250.0	70.0
Finland	0	0	0	0	18.0
France	25.0	17.1	46.2	150.0	636.1
French Morocco	2.0	2.1	—4.8	10.0	2.3
West Germany	68.0	61.5	10.6	454.0	302.5
Italy (incl. Sicily)	11.4	4.2	171.5	150.0	546.0
Netherlands	20.5	19.6	4.6	115.0	261.0
Norway	0	0	0	0	1.8
Portugal	0	0	0	0	22.9
Spain	0	0	0	0	110.7
South Africa	0	0	0	0	21.1
Sweden	0	0	0	0	45.9
Switzerland	0	0	0	0	1.8
Turkey	6.4	3.3	93.9	65.0	7.4
United Kingdom	1.1	1.1	0	5.0	631.8
Yugoslavia	5.4	5.0	8.0	36.0	11.5
West Africa	0	0	0	10.0	0
Total	**237.2**	**217.9**	**8.9**	**1,655.0**	**2,875.0**
Total non-Communist foreign	**7,537.2**	**6,939.1**	**8.6**	**173,174.0**	**8,036.6**
United States	**7,149.4**	**6,806.9**	**5.0**	**32,697.4**	**9,391.0**
Total Free World	**14,686.6**	**13,746.0**	**6.8**	**205,871.4**	**17,427.6**
Russia and controlled areas	**1,850.0**	**1,450.0**	**21.6**	**25,000.0**	**1,550.0**
Total world	**16,536.6**	**15,196.0**	**8.8**	**230,871.4**	**18,977.6**

★ **PRODUCTION—RESERVES**

Suez crisis prevented record increase

WHEN Egypt and Syria struck back at the British and French by shutting down the Suez Canal and blowing up the pipeline, they cut a healthy slice from what would have been another record increase in Free World oil production for 1956.

With Middle East oil production sharply curtailed during the fourth quarter, the non-Communist world still chalked up a daily average production of 14,686,600 bbl., or a gain of 6.8 per cent over 1955. The 1955 gain over the previous year was 11 per cent.

The Free World was headed for a healthy increase of at least 12 per cent when the Middle East crisis curbed the gain sharply.

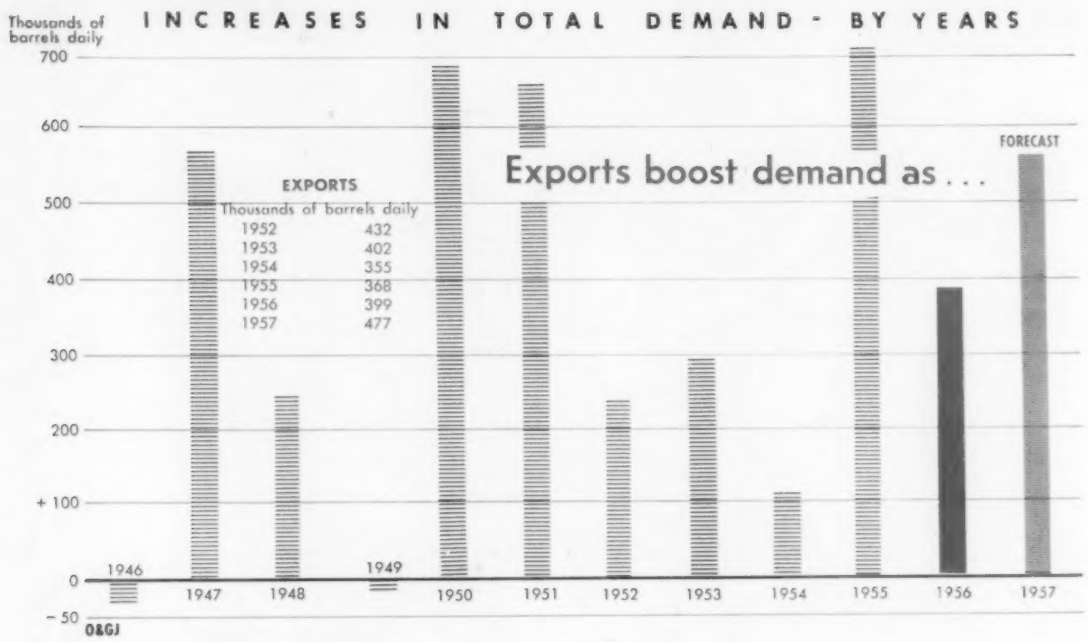
The United States accounted for 7,149,400 bbl. of that daily average figure and the other oil-producing areas outside the Russian-controlled orbit produced 7,537,200 bbl.

The drastic cutbacks in Middle East oil production during the last quarter of the year left the region with only a 3.4 per cent gain over 1955 production averages. The Middle East was well on its way to a 13 per cent increase when the Suez crisis halted the trend abruptly. Iraq and Kuwait actually slipped behind the 1955 production averages, but pre-Suez increases in Iran, the Neutral Zone, and Saudi Arabia helped the area show the slight increase that it did.

Latin America, led by Venezuela, showed a 14.3 per cent gain over 1955. Venezuela increased her production steadily throughout the year and when Europe was cut off from its normal Middle East supplies, the country pushed up its output sharply in the fourth quarter of the year.

Soviet Russia and the satellite nations behind the Iron Curtain showed a gain of 21.6 per cent over 1955 production with all the increase coming from new producing areas in Russia and Red China.

★ SUPPLY–DEMAND



"*. . . with all its changes, 1957 will be*

. . . best oil year in history"

FOR the year 1956, the percentage gain in total demand was larger than the increase in domestic demand. The same thing will happen in 1957. It means that the rate of gain for exports was higher than that for domestic demand.

The general export trend has been downward since the end of the war. The outstanding exceptions have been in 1951 and 1956. In 1951 product exports, influenced by the Korean War, helped boost exports for the year by 38.4 per cent compared with an increase of 8.2 per cent for domestic demand.

In 1956, exports to Europe during the last 2 months of the year were the major factor in the 8.4 per cent increase over exports in 1955. Total-exports forecast for 1957 represents a gain of 19.6 per cent over 1956. These shipments to Europe constitute an important segment of the increase in total demand.

Domestic demand for all petroleum products averaged about 8,813,000 bbl. daily for 1956. Exports added another 399,000 bbl. daily for an over-all total of 9,212,000 bbl. daily.

For 1957, domestic demand is forecast at 9,293,000 bbl. daily, exports at 477,000 bbl. daily, and total demand at 9,770,000 bbl. daily.

The forecasts for 1957 are based on the following assumptions:

. . . **Repairs to the Suez Canal** will permit limited traffic by the end of the first quarter and near-normal operation by the end of the second quarter.

. . . **Pipelines** bringing Middle East crude to the eastern Mediterranean will be operating during part of the second quarter.

. . . **Crude imports** during the first quarter will be cut by about the amount normally received from the Middle East with a small gain in the second quarter.

. . . **Product imports** will be changed very little by the emergency measures required to supply Europe during the first half of the year.

. . . **Imports will return** to the same pattern that existed before the Suez crisis as soon as transportation is back to normal. If there is any firm limitation placed on imports, the ratio of production to imports will increase proportionately.

. . . **Weather will be normal** during the first and last quarters of the year.

. . . **Higher prices** will cut domestic demand for residual fuel by at least 25,000 bbl. daily.

. . . **Refinery operations** will be shifted and limited in the first quarter to permit heavy withdrawals from fuel storage and to hold the gasoline buildup to a gain of less than 25,000,000 bbl. during the quarter.

. . . **The over-all economy** will remain at a high level during the first half, and any leveling off in the last half will not be severe enough to bring any important reductions in petroleum demand.

The abnormal increase in product stocks was the outstanding feature of the supply-demand picture for 1956. Most of the gain was in finished products. Crude stocks at the end of the year totaled only about 400,000 bbl. more than at the start, but products from refineries and field-processing plants crowded storage for a net addition of about 54,000,000 bbl. for the year or 147,000 bbl. daily.

This gain almost set a new record. The only year

in the oil industry's history with a larger net addition to product stocks than 1956 was the unusual year 1948. It was the abnormal stock gain in the summer of that year that caused the Journal to predict, in August, that the postwar oil shortage was over.

The need for a sharp stock reduction after the buildup in 1948 plus the increase in imports resulted in a drop in domestic production for 1949. The oil industry seemed to be headed the same direction in 1956 but was detoured by the Suez crisis with its increase in exports and decrease in imports.

Most of the stock gain forecast for 1957 is in crude. Inventories of crude, down to about 266,000,000 bbl. at the end of 1956, will drop still more in the first quarter. Gains in the second, third, and fourth quarters will result in a net increase of about 14,000,000 bbl. for the year.

Another unusual condition for 1957 is shown by the forecast. The percentage gain in crude production is larger than the percentage gain in domestic demand. This situation is related to the European shortage. The major portion of the gain in exports will be in crude. Also, the tanker shortage will prevent imports of Middle East crude in the early part of the year. And last, most of the stock increase for the year will be crude. All of these factors tend to raise the demand for domestic crude.

Domestic demand for all products in 1957 will be 480,000 bbl. daily above the average for 1956. Gasoline plus distillate fuels will account for 71 per cent of the total gain.

Jet fuel is the product with the largest relative expansion in 1957. The volumetric gain of 46,000 bbl. daily represents a boost of 25.4 per cent over last year.

With all its changes, 1957 will be the best oil year in history.

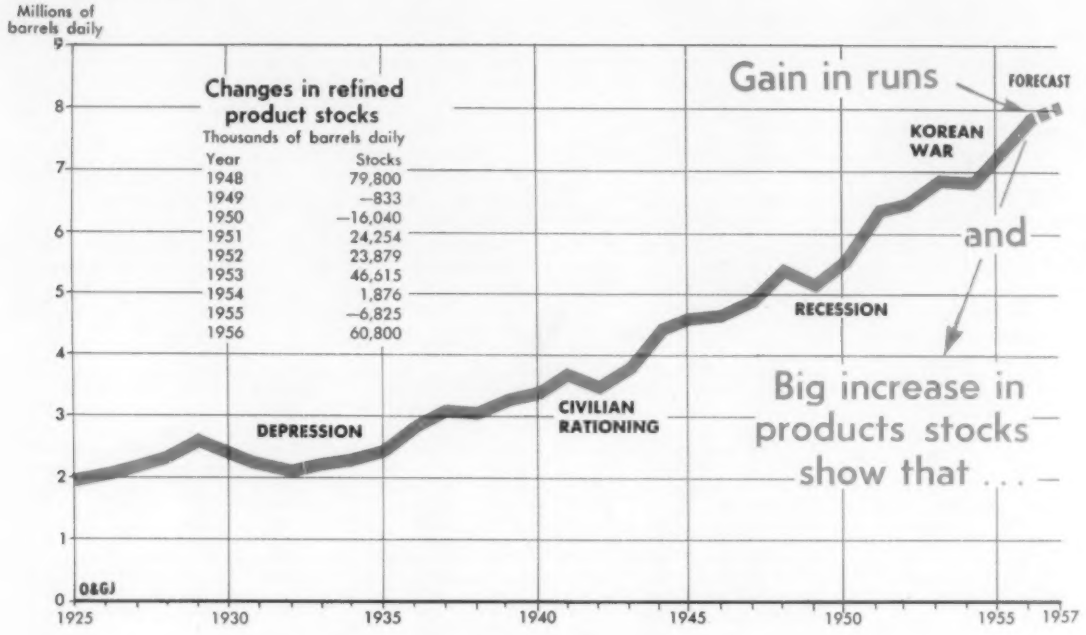
Here's the Journal supply and demand forecast by quarters

(Thousands of barrels daily)

	Year	First quarter		Second quarter		Third quarter		Fourth quarter		Year 1957	
	1956*	Volume	Per cent change	Volume	Per cent change	Volume	Per cent change	Volume	Per cent change	Volume	Per cent change
Domestic demand	**8,813**	**9,840**	**4.0**	**8,725**	**4.1**	**8,724**	**7.1**	**9,891**	**6.8**	**9,293**	**5.5**
Gasoline	3,766	3,600	5.0	4,210	5.1	4,220	7.8	3,875	4.4	3,978	5.6
Kerosine	319	462	—3.1	195	1.6	212	—8.2	445	18.3	328	2.8
Distillate	1,714	2,550	6.2	1,345	3.4	1,225	6.7	2,265	12.9	1,843	7.5
Residual	1,539	1,790	—2.2	1,400	—1.9	1,280	2.4	1,660	0.7	1,531	—0.5
Jet fuel	181	212	34.2	220	19.6	235	26.3	240	21.8	227	25.4
Lubricants	122	118	3.5	122	—2.4	120		120	—7.0	120	—1.6
L.P.G.	432	518	4.0	403	8.9	427	11.8	551	14.3	475	10.0
Asphalt and road oil	276	145	14.2	345	13.9	500	14.4	250	6.4	311	12.7
Other products	417	400	4.2	440	3.3	460	6.2	440	3.3	435	4.3
Crude loss	47	45	—4.2	45	—4.2	45	—4.2	45	—2.2	45	—4.2
Exports	**399**	**714**	**139.6**	**526**	**52.5**	**355**	**—3.5**	**321**	**—44.9**	**477**	**19.6**
Gasoline	90	90	13.9	85	—2.3	85	—16.7	85	—8.6	86	—4.4
Kerosine	9	10	150.0	10	11.1	5	25.0	6	—66.7	8	—11.1
Distillate	80	90	55.1	75	11.9	70	—2.8	60	—50.8	74	—7.5
Residual	73	75	31.6	80	5.3	70	—13.6	65	—15.6	72	—1.4
Jet fuel											
Lubricants	38	37	2.8	40	—4.7	40	5.3	40	14.3	39	2.6
L.P.G.	12	13		10		10	—16.7	10	—16.7	11	8.3
Asphalt and road oil	4	4	—20.0	4	33.3	5		5	25.0	5	25.0
Other products	21	20	17.6	22	4.8	20	—13.0	20	—9.1	20	4.8
Crude	72	375	1,193.1	200	566.7	50	66.7	30	—566.7	162	125.0
Total demand	**9,212**	**10,554**	**8.1**	**9,251**	**6.0**	**9,079**	**6.6**	**10,212**	**3.8**	**9,770**	**6.1**
Gasoline	3,856	3,690	5.2	4,295	4.9	4,305	7.2	3,960	4.0	4,064	5.4
Kerosine	328	472	—1.9	205	2.0	217	—7.7	451	14.5	336	2.4
Distillate	1,794	2,640	7.3	1,420	3.8	1,295	6.1	2,325	9.2	1,917	6.8
Residual	1,612	1,865	—1.2	1,480	—1.5	1,350	1.4	1,725		1,603	—0.6
Jet fuel	181	212	34.2	220	19.6	235	25.7	240	21.8	227	25.4
Lubricants	160	155	3.3	162	—3.0	160	1.3	160	—2.4	159	—0.6
L.P.G.	444	531	3.9	413	8.7	437	10.9	561	13.6	486	9.5
Asphalt and road oil	280	149	12.9	349	14.1	505	14.3	255	6.7	316	12.8
Other products	438	420	4.7	462	3.4	480	5.3	460	2.7	455	3.9
Crude	119	420	452.6	245	218.2	95	23.4	75	—228.0	207	73.9
Stock change	**148**	**—745**		**344**		**674**		**—120**		**42**	
Crude	1	—150		100		100		100		39	
Products	147	—595		244		574		—220		3	
New supply	**9,360**	**9,809**	**3.7**	**9,595**	**3.7**	**9,753**	**4.5**	**10,092**	**7.2**	**9,812**	**4.8**
Imports	**1,416**	**1,285**	**—9.6**	**1,200**	**—13.2**	**1,450**	**0.6**	**1,710**	**20.5**	**1,412**	**—0.3**
Crude	927	650	—24.6	750	—17.9	1,000	—4.1	1,070	20.4	869	—6.3
Products	489	635	13.4	450	—4.1	450	13.1	640	20.6	543	11.0
Production	**7,944**	**8,524**	**6.1**	**8,395**	**6.7**	**8,303**	**5.3**	**8,382**	**4.9**	**8,400**	**5.7**
Crude	7,149	7,664	6.0	7,600	7.0	7,500	5.4	7,500	4.8	7,565	5.8
Natural, etc.	795	860	7.0	795	3.9	803	4.0	882	5.1	835	5.0
Runs to stills	**7,934**	**8,026**	**0.4**	**7,987**	**2.1**	**8,287**	**3.4**	**8,377**	**5.9**	**8,170**	**3.0**
Total stocks	**769.4**	**702.3**		**733.6**		**795.6**		**784.6**		**784.6**	
Gasoline	185.5	214.8		189.0		177.0		185.0		185.0	
Kerosine	31.0	19.0		26.0		34.0		31.0		31.0	
Distillate	131.0	68.0		98.0		151.0		134.0		134.0	
Residual	42.7	34.0		40.6		48.4		45.0		45.0	
Other products	113.1	113.9		118.3		114.3		109.5		109.5	
Crude	266.1	252.6		261.7		270.9		280.1		280.1	

*Partly estimated. Stocks in millions of barrels at end of period.

★ REFINING



"Refiners did their job too well"

PETROLEUM refiners in the United States successfully met the challenge of 1956 to produce more and better products.

In foreign areas general trends were similar with a larger percentage of growth but with less emphasis on some of the newer processes required in this country to assure satisfactory products.

The only criticism voiced in this country, with which this discussion is concerned, was that the owners of 313 operating refineries located in 37 states and in Puerto Rico, had done their job too well. Their output of some products, particularly gasoline, was larger over most of the year than current markets required.

Some also felt that the domestic refining industry, with large increases in capital investments and operating costs, had improved motor-fuel properties more than was required for 1956 and earlier motor vehicles.

As a result of excess supplies, plant realizations and profits were not as large as expected at the start of the year. In some cases realizations improved in the latter part of the year due to higher prices for the residual fuels.

1957 Outlook

The outlook for 1957 as projected by many refiners was "more of the same." By that is meant that 1957 will be another record year in crude runs to stills along with continued emphasis on quality of products. Price trends will be determined by how well operators balance increased output and inventories with current demand in the face of substantially higher crude costs.

Domestic crude runs to stills in 1956 averaged 7,934,000 bbl. daily, a gain of 454,000 bbl. or 6 per cent over 1955. This is one of the largest yearly volume gains in the history of the industry and about 1.5 per cent greater than was anticipated at the start of the year. The output exceeded the total demand gain of 4.5 per cent.

It is predicted that crude runs to stills in 1957 will average 8,170,000 bbl. daily, a gain of 3.0 per cent over 1956.

Providing for an average 1957 increase of 236,000 bbl. daily to crude runs to stills in atmospheric and vacuum distillation operations, will not represent a major outlay as expenditures are measured in today's refinery operations. The cost of the initial distillation operation is now a small part of the total. Little and in some cases none of the products from the primary distillation operation at refineries are suitable in specifications for today's market. They are either further refined or blended off with more other products obtained in additional processing.

The situation in the case of motor fuels, the refining industry's principal product, is outstanding in this regard.

Despite the several billion dollars expended in new facilities for the manufacture of motor fuels since the close of World War II, refinery yields in recent years have shown practically no increase. The yields in fact are slightly lower than they were in the late thirties when the principal operations of a typical refinery consisted of crude distillation and thermal cracking.

The explanation largely lies in the fact that the octane ratings of gasoline pools at representative refineries have been increased 10 to 12 points over the past 10 years.

As octane ratings have increased, capital outlays

and operating costs have increased. The end in that trend is not in sight and will again be controlling in 1957 and later operations.

It is now apparent that the maximum results in conventional cracking and reforming operations will not satisfy the expanding requirements in the octane pools (regular, premium, superpremium, and aviation grades) at many refineries. Because of this development, alkylation, isomerization, and related operations were expanded in 1956 and this trend will continue with additional emphasis in 1957.

Jet Fuels

Gasoline yields have also suffered from the rapidly increasing demands for jet fuels. The estimated production of jet fuels last year totaled 64,720,000 bbl., a gain of 14 per cent over 1955 and 39 per cent over 1954. Last year the production of jet fuels exceeded that of lubricating oils by 8.5 per cent and was 52 per cent as large as the kerosine output.

The latest report of the Bureau of Mines shows that jet-fuel output is supplied 78 per cent from gasoline, 16 per cent from kerosine, and 6 per cent from distillate.

This means that refiners last year had to draw on their gasoline output for about 50 million barrels for use as blending material in jet fuels. Were it not for that fact the gasoline yield in 1956 would have been 45.1 per cent instead of 43.4. The kerosine yield would have been .3 per cent higher and the distillate yield .1 per cent. Projections call for still greater output of jet fuel in 1957 and a steady climb over a period of several years.

Refinery yield trends . . .

	Runs (thou. bbl. daily)	Yields (per cent) Gasoline	Kerosine	Distillate	Residual
1936	2,920	44.1	5.3	11.8	27.0
1937	3,242	43.9	5.5	12.4	26.4
1938	3,192	44.3	5.5	13.0	25.3
1939	3,391	45.0	5.5	13.1	24.7
1940	3,536	43.1	5.7	14.2	24.4
1941	3,861	44.2	5.2	13.4	24.3
1942	3,655	39.8	5.1	14.7	26.9
1943	3,917	37.1	5.0	14.8	29.2
1944	4,551	39.4	4.7	14.4	27.7
1945	4,711	40.9	4.7	14.5	27.3
1946	4,740	39.6	6.0	16.6	24.9
1947	5,075	40.2	6.0	16.8	24.2
1948	5,549	40.3	6.0	18.7	22.9
1949	5,326	43.7	5.2	17.4	21.7
1950	5,739	43.0	5.6	19.0	20.2
1951	6,494	42.4	5.7	20.0	19.7
1952	6,670	43.0	5.4	21.3	18.6
1953	7,000	43.9	4.8	20.7	17.6
1954	6,958	43.8	4.8	21.3	16.4
1955	7,480	43.9	4.3	22.0	15.3
1956	**7,934**	**43.4**	**4.2**	**22.8**	**14.6**

Another development which increased in importance in 1956, and will further expand in 1957, had to do with the installation of what is often given the classification of "clean-up processes." This includes the hydrogenation operations for the removal of sulfur, a factor in octane ratings of clear fuels and also in lead susceptibility of blending materials. More and more emphasis has also been given to fractionation to obtain products for blending, for further refining, and for the production of petrochemical ingredients.

Distillate

Distillate production jumped to 665,137,000 bbl. in 1956, a gain of 10.3 per cent over 1955. About one-third of this greater output was made possible by an increase of .8 per cent to 22.8 per cent in refinery yield of distillate.

Generally higher fuel-oil prices, a reflection of a better balance in supply and demand than prevailed for the other principal refinery products, slowed up the steady reduction in residual output from crude oil. The yield dropped .7 per cent to 14.6 in 1956 which compares with a 1.1 per cent reduction in 1955 and 1.2 per cent in 1954.

Minor Products

Among the minor refinery products production in 1956 changes were:

1. Lubricants increased 6.3 per cent to 59,600,000 bbl.
2. Wax increased 2.4 per cent to 5,420,000 bbl.
3. Coke increased 10 per cent to the equivalent of 31,260,000 bbl.
4. Asphalt increased 8.5 per cent to 90,200,000 bbl.
5. Road oil decreased 4.5 per cent to 8,100,000 bbl.
6. L.P.G. produced at refineries increased 10 per cent to 51,740,000 bbl.

For 1957 and over a period of several years substantial increases in asphalt output are expected. This reflects the mammoth highway programs just now getting under way because of a 33½-billion-dollar additional federal-aid program.

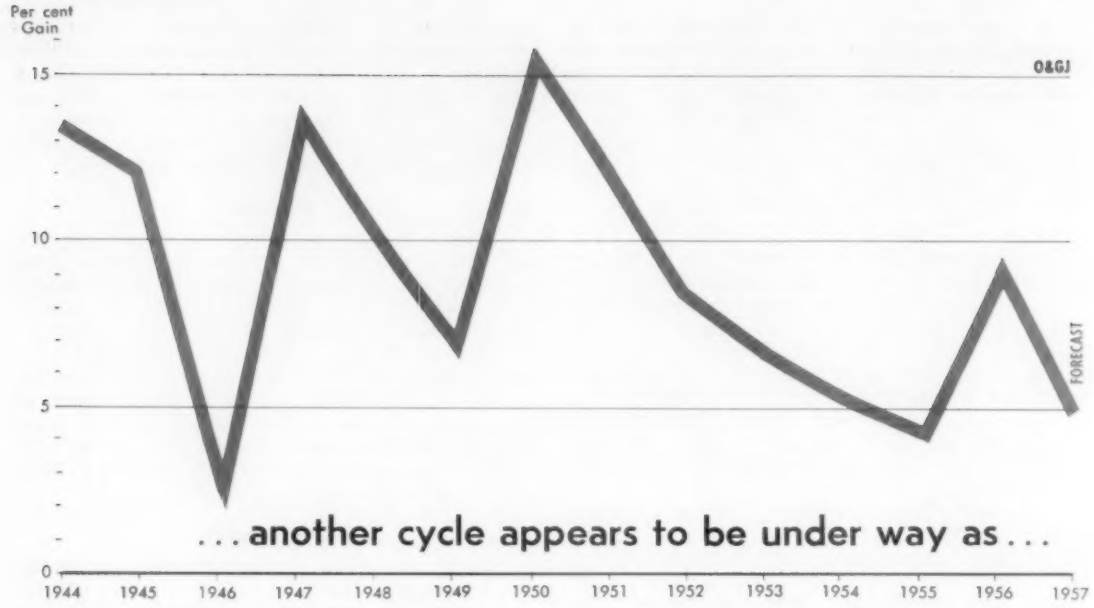
Refining Areas

The increase of 6 per cent in crude-oil runs to stills in 1956 was general over most of the United States. The only increase in refining position as reported by the Bureau of Mines was the Indiana, Illinois, etc. (Middle West) region. This area increased its comparative position .5 per cent to 18.3 per cent. This gain was offset by a decrease of .4 per cent in the Oklahoma, Kansas, etc., area, and .1 per cent on the West Coast.

. . . and runs by districts in the U.S.

REFINERY RUNS BY DISTRICTS
(Thousands of barrels daily)

	1926	1931	1936	1941	1946	1951	1952	1953	1954	1955	1956	% of total 1956	% of total 1926
East Coast	358	463	507	595	758	1,015	1,029	1,045	1,030	1,065	1,125	14.2	16.8
Appalachian	78	100	106	146	153	179	183	198	186	194	203	2.6	3.7
Illinois, Indiana, etc	191	316	404	688	767	1,201	1,227	1,277	1,276	1,369	1,489	18.8	8.9
Oklahoma, Kansas, etc.	264	288	313	348	379	520	544	589	601	671	684	8.6	12.4
Texas Inland	97	168	186	183	216	245	257	256	238	254	271	3.4	4.5
Texas Gulf	331	427	637	995	1,163	1,567	1,599	1,698	1,689	1,841	1,955	24.6	15.5
Louisiana Gulf	138	110	127	149	332	502	522	550	573	656	701	8.8	6.5
North Louisiana, Arkansas, etc.	57	54	65	81	60	79	80	86	88	91	94	1.2	2.7
Rocky Mountain	80	51	57	92	132	230	240	254	257	276	291	3.7	3.7
West Coast	541	474	518	584	780	956	989	1,047	1,020	1,063	1,121	14.1	25.3
Total United States	**2,135**	**2,451**	**2,920**	**3,861**	**4,740**	**6,494**	**6,670**	**7,000**	**6,958**	**7,480**	**7,934**	**100.0**	**100.0**



Gas-liquids production shoots up

PERCENTAGE increases in natural-gasoline and cycling-plant production since 1943 can be represented by a series of cycles, but not all have the same time period.

The annual percentage gains gradually decline for several years and then jump within a single year to a new peak to start another period of smaller and smaller increases until the series is repeated.

The year 1956 seems to have started another cycle. Total production for the year averaged about 793,500 bbl. daily for a gain of 9.7 per cent over 1955. The increase in 1955 was only 4.7 per cent, and the forecast for 1957 calls for a gain of 5.0 per cent.

Despite these variations in the pattern of gain, every year since 1941 has been a record year. Production will top 800,000 bbl. daily in 1957 when the total is expected to be 3.8 times production in 1941, the first year with complete reporting.

The percentage gain in production for 1956 was about equal to the average annual gain for the past 14 years. The 14-year average has been 9.6 per cent compared with the 9.7 per cent in 1956.

The year 1950 showed the greatest percentage gain, but since the increases in later years have been calculated from a larger base, the all-time record for volumetric gain goes to 1956 with a total increase 70,300 bbl. daily.

The increase in plant production between 1941 and 1956 was 572,000 bbl. daily. This gain in volume is almost as much as the current Oklahoma production.

Most of the net gain in plant production in 1956 was in the output of liquefied petroleum gas, called L.P.G. in the accompanying tables. The boost in L.P.G. production accounted for 51,400 bbl. daily or 73.1 per cent of the total gain of 70,300 bbl. daily. Natural gasoline production was up 16,300 bbl. daily, and other finished products were upped 2,600 bbl. daily.

Part of the big increase in L.P.G. production for 1956 can be credited to availability of underground storage. High demand for L.P.G. during the periods of below-normal temperatures last winter cut inventories to very low levels. Actual inventories at plants, terminals, and in underground storage dropped below the previous year by sometime in April.

Light products poured into underground storage at a rapid rate from the end of April until the end of October. Total additions for the 5-month period, April

PRODUCT OUTPUT AT NATURAL-GASOLINE AND CYCLING PLANTS—1956*

(Thousands of barrels daily)

	L.P.G.	Natural gasoline	Other	Total	Per cent increase
Appalachian	11.0	2.7	0.1	13.8	11.3
Ill., Ky., Mich.	34.9	4.2	0.1	39.2	17.4
Kansas	6.4	6.9		13.3	9.1
Oklahoma	38.7	32.6	0.2	71.5	15.7
Nebraska†	3.3	1.3		4.6	
Arkansas	3.7	2.6	0.3	6.6	—4.3
Louisiana	20.4	19.3	33.2	72.9	6.9
Gulf	9.3	12.4	15.8	37.5	17.2
Inland	11.1	6.9	17.4	35.4	—2.2
Mississippi	0.7	1.0	0.6	2.3	—4.2
New Mexico	19.7	17.9	0.6	38.2	11.7
Texas	239.0	145.9	47.6	432.5	10.0
Gulf Coast	43.7	35.3	17.4	96.4	12.1
West Texas	72.4	62.7	0.2	135.3	8.2
East Texas	16.4	10.0	0.4	26.8	—6.0
Panhandle	60.5	5.3	0.4	66.2	8.2
Other Texas	46.0	32.6	29.2	107.8	16.8
Rocky Mountain	7.4	5.8	0.3	13.5	32.4
California	27.4	54.0	3.7	85.1	1.0
Total U. S.	**412.6**	**294.2**	**86.7**	**793.5**	**9.7**

*Ten months actual, 2 months estimated. †Includes North Dakota.

TOTAL PLANT PRODUCTION BY YEARS
(Thousands of barrels daily)

	1951	1952	1953	1954	1955	*1956
Appalachian	14.4	16.4	13.3	14.1	12.4	13.8
Ill., Ky., Mich.	14.0	19.9	24.9	32.3	33.4	39.2
Kansas	11.7	12.5	14.1	13.7	16.4	13.3
Oklahoma	48.2	50.8	55.3	56.5	61.8	71.5
Nebraska†						4.6
Arkansas	6.4	7.2	7.4	7.1	6.9	6.6
Louisiana	61.6	63.1	62.2	61.8	68.2	72.9
Gulf	24.1	26.1	27.5	27.0	32.0	37.5
Inland	37.5	37.0	34.7	34.8	36.2	35.4
Mississippi	3.3	3.4	3.3	2.8	2.4	2.3
New Mexico	15.3	18.1	19.1	29.1	34.2	38.2
Texas	297.3	328.3	360.6	369.2	393.0	432.5
Texas Gulf	68.4	74.9	76.4	76.6	86.0	96.4
West Texas	63.2	74.1	101.0	109.7	125.0	135.3
East Texas	30.4	33.1	32.1	27.7	28.5	26.8
Panhandle	49.0	51.8	55.6	58.8	61.2	66.2
Other Texas	86.3	94.4	95.5	96.4	92.3	107.8
Rocky Mountain	7.9	8.6	8.1	9.1	10.2	13.5
California	80.9	82.3	85.3	84.1	84.3	85.1
Total U. S.	**561.0**	**610.6**	**653.6**	**679.8**	**723.2**	**793.5**

*Ten months actual, 2 months estimated. †Includes North Dakota. Both combined with Kansas prior to 1956.

PRODUCT OUTPUT BY YEARS
(Thousands of barrels daily)

	Natural				Per cent incr.	
	L.P.G.	gasoline	Other	Total	Total	L.P.G.
1943	59.4	138.0	42.9	240.3	5.3	17.6
1944	76.1	142.4	54.8	273.3	13.7	28.1
1945	‡84.8	‡170.4	51.7	306.9	12.3	11.4
1946	89.6	177.9	49.6	317.1	3.3	5.7
1947	120.8	181.6	59.7	362.1	14.2	34.8
1948	140.0	197.5	63.3	400.8	10.7	15.9
1949	155.2	199.7	75.5	430.4	7.4	10.9
1950	195.2	213.4	90.0	498.6	15.8	25.8
1951	232.4	234.1	94.5	561.0	12.5	19.1
1952	272.5	244.7	93.4	610.6	8.8	17.2
1953	301.4	256.4	95.8	653.6	7.0	10.6
1954	339.5	267.8	83.5	690.8	5.7	12.6
1955	361.2	277.9	84.1	723.2	4.7	6.4
1956*	**412.6**	**294.2**	**86.7**	**793.5**	**9.7**	**14.2**
1957†	445.0	303.0	85.0	833.0	5.0	7.9

*Ten months actual, 2 months estimated. †Forecast. ‡Iso-pentane included in natural gasoline, starting with 1945.

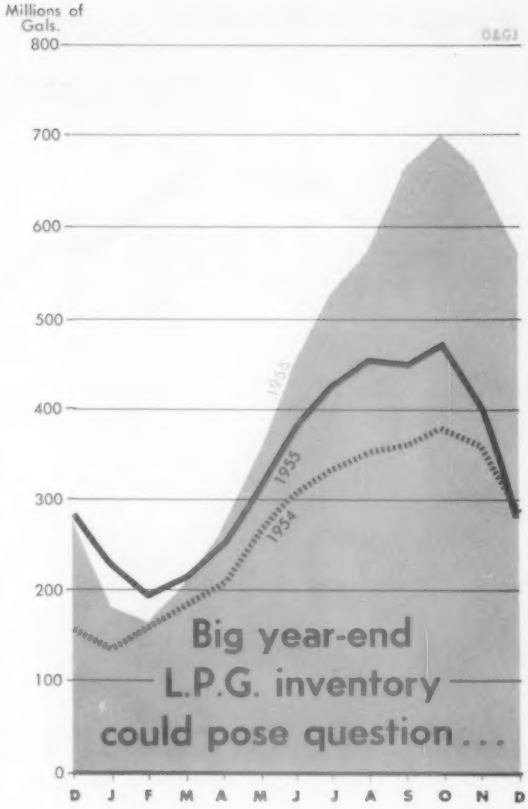
AVERAGE NATURAL-GASOLINE PRICES—GRADE 26-70
(Cents per gallon)

	1956		1955	
	Group 3	North Texas	Group 3	North Texas
January	5.82	5.29	5.50	5.00
February	5.36	4.84	5.05	4.50
March	4.95	4.44	4.50	4.00
April	4.50	4.00	4.50	4.00
May	4.50	4.00	4.50	4.00
June	4.50	4.00	4.53	4.05
July	4.50	4.00	5.00	4.50
August	4.50	4.00	5.00	4.50
September	4.88	4.40	5.48	4.98
October	4.98	4.48	5.50	5.00
November	4.50	4.00	6.00	5.48
December	4.50	4.00	5.94	5.50
Year average	**4.79**	**4.29**	**5.13**	**4.63**

through September, amounted to 403.9 millions of gallons. This net addition to stocks represented 16.4 per cent of total plant production for the period.

With storage space available for finished products, plants were operated nearer capacity rates than for any other summer in recent years.

This period of rapid additions to storage was followed by warmer-than-normal weather in the last quarter of the year. Warm weather during the winter quarters means lower demand for L.P.G. Stocks increased 34 million gallons in October, a month that normally shows a small reduction. Stock withdrawals amounted



What about storage next summer?

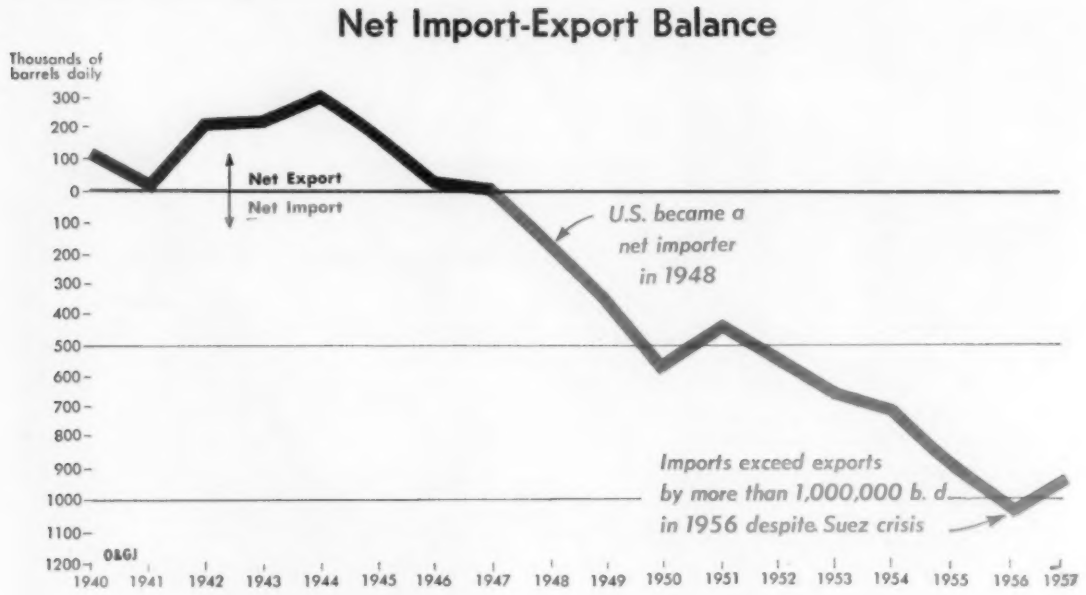
to less than 39 million gallons in November. End-of-year stocks were almost twice the total for end of 1955.

Unless stocks are worked off by very cold weather in January and February, the end-of-season surplus may have a depressing effect on prices next summer. With storage space available all through last summer, there was no dumping at giveaway prices. For this to be true in the summer of 1957, operators will need to work off surplus stocks before the end of March.

In addition to the L.P.G. produced at plants, refiners added about 144,000 bbl. daily to be marketed as fuels or sold as base stocks for chemicals. On the other hand, part of plant output was shipped to refineries for blending into motor fuels. Only about 70 per cent of the L.P.G. from plants is sold for fuel and chemical uses.

Total fuel and chemical demand for L.P.G. in 1956 is estimated at 444,000 bbl. daily or about 10.2 per cent more than in 1955.

Markets for natural gasoline were influenced by excessive motor-fuel stocks in 1956. Note on the accompanying table that the average plant price for Grade 26-70 natural was about 0.34 cent a gallon less than in 1955. Prices were a little higher than the year before during the first quarter. The real pressure on the market started about July. Conditions did not improve with cold weather. In fact, prices in November and December were back to midsummer levels. Prices are normally at a peak in November and December.



Imports problem is taking a holiday

LAST year was a thriller in the imports drama. The buzz saw of foreign oil cut steadily toward the heroine—domestic production—who struggled futilely to get out of the red tape which bound her in its path. But just in the nick of time a bomb aimed at the Suez Canal blew up the whole works.

But the villain still pursued her. When the curtain fell on the 1956 act it was evident that imports problem was not dead—just gone on a European trip and probably would return more vigorous than ever. Statistics tell the story.

In 1956 imports of foreign crude oil and petroleum products into the United States reached an average of 1,416,000 bbl. per day. This was 167,000 bbl. per day—or 13.4 per cent—higher than 1955 imports. And 1955 imports were 18.7 per cent higher than the year before. If it hadn't been for the unpleasantness in the Middle East that closed the Suez Canal in November, the percentage increase last year undoubtedly would have been higher than the 1955 increase. In fact, crude increased 23 per cent during the first 10 months.

Domestic producers, who have been fighting to curb imports for years, were keenly aware of this probability. They kept barking at the heels of the Office of Defense Mobilization to get it to do something to enforce the congressional policy that imports should not injure a domestic industry. They relied on the 1954 recommendation of the President's Cabinet Committee on Energy Supplies and Resources Policy that oil imports be kept to the 1954 ratio of domestic production.

ODM gave importers several warnings and requests to cut. But imports kept creeping upward. Finally, in the fall, ODM held a hearing. Then it worked out a new program for holding imports in line, gave importers a deadline for acceptance, and got ready some enforcement measures. Barely hours before the scheduled crackdown, the roof fell in in Egypt. It was obvious that instead of importing from the Middle East we would be exporting to Europe. The imports problem went into an ODM pigeon hole.

Now back to the figures.

The 1954 ratio of imports to domestic production—the elusive "desirable" level—was 10.34 per cent for crude and 6.24 per cent for products. In 1955, imports edged over this, the ratio being 11.54 per cent for crude and 6.85 per cent for products.

Crude Imports—the Problem Child

But in 1956, crude imports were in the ratio of 13 per cent of domestic production, while the products imports ratio stayed steady at 6.8 per cent. The actual performance was that crude imports were 145,000 bbl. per day (or 18.5 per cent) higher than in 1955, and products imports were 22,000 bbl. per day (or 4.7 per cent) above 1955.

Thus it's obvious that products imports are staying pretty much in the groove, but crude imports are the problem child.

A year ago it was Middle East crude that was the chief target of those pressing for curtailment. Domestic producers nominated the Middle East as the area most likely to succeed in expanding its production rapidly at low cost and in taking over U. S. markets. The ODM, probably motivated more by defense reasons, attempted to get voluntary cuts in Middle East imports while exempting Canada and Venezuela from curtailment.

The results are shown in a table and the pie charts with this article. The figures on crude imports by country of origin are for the first 10 months of this year, which brings the 1956 figures right up to the time the Suez was blocked (though tankers already cleared kept coming and unloaded days or weeks later).

Where imports come from . . .

First 10 Months
(Thousands of barrels daily)

	1956	1955	Change Volume	Change Per cent
Mexico	16.4	17.7	—1.3	—7.3
Colombia	25.6	21.6	4.0	18.5
Venezuela	448.5	390.9	57.6	14.7
Peru	1.6	2.4	—0.8	—0.3
Ecuador	1.8	1.1	0.7	63.6
Trinidad	1.4		1.4	
Kuwait	146.4	145.1	1.3	0.9
Saudia Arabia	81.7	78.6	3.1	3.9
Neutral Zone	10.5	7.6	2.9	38.2
Iraq	30.6	18.0	12.6	70.0
Iran	18.9	6.3	12.6	200.0
Qatar	18.4	14.6	3.8	26.0
Canada	112.3	38.1	74.2	194.8
Far East	33.3	31.4	1.9	6.1
Total crude	**947.4**	**773.4**	**174.0**	**22.5**

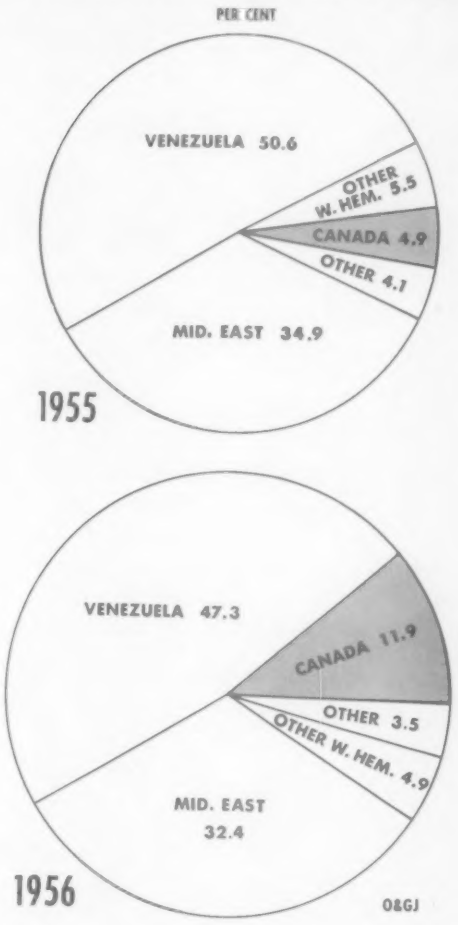
. . . and how they are trending

(Thousands of barrels daily)

	Imports Crude	Imports Products	Imports Total	Exports Crude	Exports Products	Exports Total
1940	117	112	229	141	215	356
1941	139	127	266	91	207	298
1942	34	64	98	93	227	320
1943	38	136	174	113	298	411
1944	122	130	252	93	474	567
1945	203	108	311	90	411	501
1946	236	141	377	116	303	419
1947	267	170	437	127	324	451
1948	353	161	514	109	259	368
1949	421	224	645	91	236	327
1950	487	363	850	95	210	305
1951	490	354	844	78	344	422
1952	573	379	952	73	359	432
1953	648	386	1,034	55	347	402
1954	656	396	1,052	37	318	355
1955	782	467	1,249	31	334	365
1956*						
1st quarter	**862**	**560**	**1,422**	**29**	**269**	**298**
2nd quarter	**914**	**469**	**1,383**	**30**	**316**	**346**
3rd quarter	**1,043**	**398**	**1,441**	**30**	**339**	**369**
4th quarter	**888**	**531**	**1,419**	**200**	**383**	**583**
Year	**927**	**489**	**1,416**	**72**	**327**	**399**
1957†	869	543	1,412	162	315	477

*Estimated. †Forecast.

Source of Imported Crude



Middle East imports during this 10-month period totaled 306,500 bbl. per day, which is an increase of 36,300 bbl. per day over the same part of 1955. But the percentage increase was only 13.4 per cent, whereas all crude imports were up 22.5 per cent for the period.

Thus, as the pie charts show, the Middle East, although increasing its shipments, got a smaller share of the total crude-import business last year.

Only Canada gained a larger portion of the crude import total during the first 10 month of 1956. It did this by selling the United States 112,300 bbl. of crude daily, an increase of 74,200 bbl. per day—a thumping increase of 194.8 per cent.

That shift in the relative importance of Middle East imports may have had something to do with the November decision of ODM to apply future curtailments across the board rather than to the Middle East only. Of course the Suez crisis came before ODM could put its new program into effect. It's anybody's guess when imports will again reach a level to worry domestic producers and what ODM may do about them then.

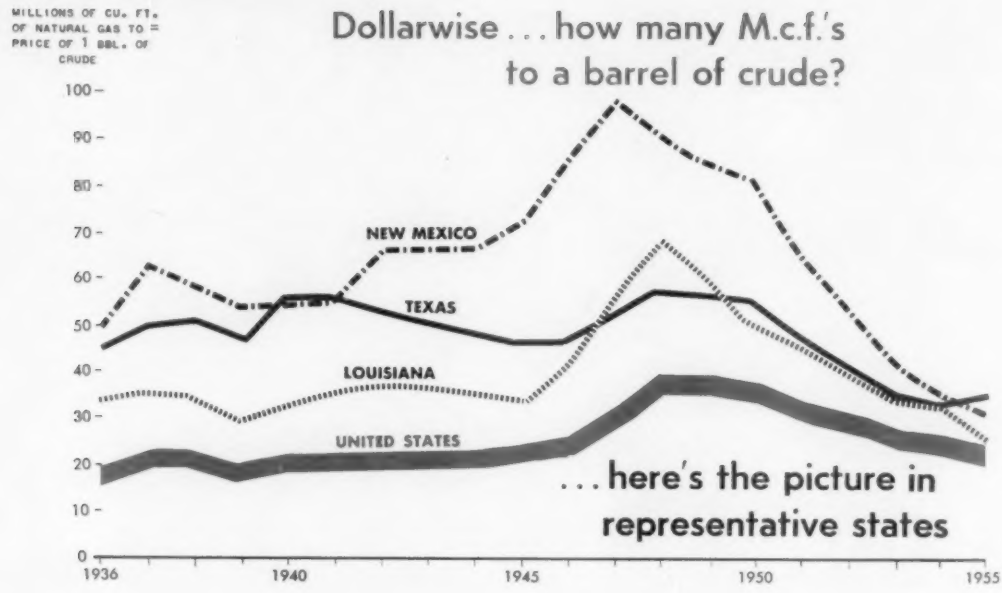
But it's the Journal's guess that imports will begin to pick up during the second quarter of 1957 and to hit their precrisis stride during the third quarter. Our import-export forecast which appears in an accompanying table is based on the assumption that the Suez Canal will be cleared for limited traffic by the end of March and will be in nearly normal operation during June.

On this basis, crude imports will average 869,000 bbl. per day during 1947, and products 543,000 bbl. per day, for a total of 1,412,000 bbl. per day—or only a smidgen under 1956.

The over-all decrease in crude imports forecast for 1957 is due to the fact that the period of Suez shutdown covers a larger portion of the year than in 1956. Products imports are not influenced nearly as much by the Suez closing since most of them come from the Caribbean and the only reduction results from temporary diversion to Europe.

U. S. exports got a temporary shot in the arm from Suez, as the first table shows. During the fourth quarter, exports of both crude and products jumped tremendously, bringing the 1957 total to the highest in several years. Our forecast is that these exports will continue at a high rate through the spring, then taper off during the summer and finally be back near the old pattern by the end of the year.

Even so, this will put 1957 oil exports higher than they have been during any year since the end of World War II.



FPC sketches a pattern to determine . . .

WHAT PRICE GAS

THE axe was poised over the necks of gas producers all last year. This year it is going to fall—unless Congress rewrites the law.

When the Harris-Fulbright bill was vetoed last February it left gas producers under the 1938 Natural Gas Act, with their sales to interstate pipelines subject to price regulation on a public-utility basis.

Now FPC is beginning to sketch the outlines of its pattern for producer price regulation. Its chief guinea pig is Phillips Petroleum Co.

For a year or so FPC has had a corps of staff accountants going over Phillips' books. Now the staff has put its findings and recommendations into the record of the FPC hearing on Phillips' prices. It's all subject to crossexamination, rebuttal, and argument before the commission itself decides the case. But what the staff proposes to do to Phillips is a guide to other producers whose turn may come soon.

In the red . . . In a nutshell, the FPC staff found that Phillips is losing at least $3,000,000 a year by selling gas below its cost plus 9 per cent.

But some of Phillips' sales are at prices above cost. The FPC staff recommended that these prices be reduced a net total of $600,000 per year. So instead of giving Phillips a chance to eliminate its deficit, the staff would put it $600,000 deeper in the red.

No bananas . . . Unlike the fruit dealer who can make up on the bananas what he loses on the coconuts, a gas producer apparently will not be allowed to balance off a good contract against a bum bargain in order to break even.

What happens to prices that are way below cost? As one of the staff told Phillips: "You are stuck with a loss to the extent that you are unable to negotiate higher prices."

In other words, FPC will not order an increase but will not object if a producer can get his purchasers voluntarily to agree to raise the price up to the limit of FPC's cost determination.

The staff apparently will accept a certain amount of averaging of costs within a particular gas-producing region, but not a company's over-all business.

It divided Phillips' gas business into three areas—Panhandle, Permian, and "miscellaneous" (including everything from the San Juan basin to offshore Louisiana). It averaged the costs and rates in each area and came up with "indicated rates", meaning the maximum that Phillips should get.

The results looked like this:

	Current prices	Cost per M.c.f.	Indicated rate	Change needed
Panhandle	9.778	9.4091	9.42	—$1,101,356
Permian	7.765	8.4191	8.40	+$ 710,050
Miscellaneous	9.197	13.8133	13.81	+$3,420,970
Total	9.231	9.8499	9.85	+$3,029,664

This would cut Phillips' prices in the Panhandle $1,100,000 a year and raise them $700,000 in the Permian. But elsewhere Phillips would be "stuck" with its deficit.

Stuck with a loss . . . As the law is generally interpreted (under the Mobile case) Phillips could raise prices where FPC orders. But if FPC leaves the miscellaneous areas dangling without specific recommendations,

Phillips would have to depend on voluntary renegotiation of its contracts to bring its prices up to costs.

The staff said each area and each class of business should stand on its own feet. But it added that raising prices to the "indicated" levels of 30, 40, or 50 cents per M.c.f. in some of the miscellaneous areas would be "unrealistic"—meaning that customers wouldn't stand for it.

Up and down . . . The staff didn't attempt to find the specific cost of producing gas for each of Phillips' sales contracts. It computed an average cost for each class of sales in each area, and then assigned each purchaser an "indicated rate" approximately equal to that cost (but usually rounded off on the low side).

The result is that some customers with old contracts at low rates will have to pay more, while others will get a cut. Thus in the Panhandle area Phillips will have to revise its contracts both up and down to yield it a net of $1,101,356 per year less than it is getting now.

What gas costs . . . Some of the staff findings as to Phillips' costs and prices should be interesting to other producers in the same areas.

In the Panhandle, costs of wellhead sales of dry gas are 8.7729 cents per M.c.f., and prices under present contracts range from 2.23 to 12.13 cents and have a weighted average of 3.957 cents. Gathering system sales cost 11.1151 cents, and prices range from 10 to 14 cents with a weighted average of 13.907 cents. Residue system sales cost 9.3501, and prices range from 5.5 to 15.25 cents with a weighted average of 9.7928 cents.

In the Permian area, Phillips' sales are all residue gas. This costs 8.4191 cents per M.c.f., and prices range from 5.75 to 10.1 cents with a weighted average of 7.7648 cents.

The cost computations were obtained primarily from Phillips' books, with "adjustments" made by the staff. These adjustments, and many other details of accounting procedure, will be argued at length before the case is concluded. General interest, however, centers in three basic assumptions made by the staff:

. . . **Exploration costs** for dry-gas wells are 15 per cent of the company's total exploration expenses.

. . . **The cost of casing-head** gas can be assumed to be the same as the cost of gas-well gas.

. . . **A gas producer** is entitled to a return of 9 per cent on his investment, and 9 per cent was included in all of Phillips' cost determinations.

Phillips' accountants claim that 35 per cent of its total exploration expenditures should be allocated to gas wells. But the FPC staff rejected this as "unrealistic." It tested four different methods, with results ranging from 12 to 14 per cent, and concluded that the 15 per cent allocation was "liberal."

Casing-head assumption . . . The assumption about casing-head gas was admitted by the staff to be tentative. It said various methods of assigning or allocating costs to oil-well gas are being studied and a better formula may turn up before the Phillips hearing is concluded.

A catch in this is that the cost figure assigned to Phillips' casing-head gas everywhere is the cost found by the staff for Phillips' dry-gas production in the Panhandle only. The staff figured this cost at about 8.75 cents per M.c.f. at the wellhead, and this is the figure given as the indicated price for casing-head gas everywhere.

In the miscellaneous areas, the staff found that dry-gas costs are far above those in the Panhandle. Nevertheless, the staff used the Panhandle dry-gas cost as the assumed cost of oil-well gas everywhere, rather than relating it to dry-gas costs in the vicinity.

Some high costs . . . Some of these dry-gas costs may be interesting to other producers in these areas: Ardmore district, 28.66 cents per M.c.f.; West Oklahoma, 43.33; South Louisiana, 32.31; East Texas, 25.45; Corpus Christi-Houston, 47.79; West Texas, 39.87; New Mexico, 54.39; Kansas, 32.52.

Even when averaged off against casing-head gas at the imputed cost of 8.75 cents, these dry-gas costs bring Phillips' total costs so far above its current prices that the staff refused to make any recommendation as to what the prices should be in these areas.

The suggestion that Phillips should earn 9 per cent on its investment in gas production was advanced by the staff very gingerly. It said it is making no recommendation to the commission on this matter, but simply used 9 per cent as an arbitrary figure. The FPC usually allows gas pipelines no more than 6 per cent, but it has said that producers probably should get "somewhat more" than that because of their greater risks.

Field prices . . . Here's another interesting and perhaps significant thing: While relying on its own determination of costs as the basis for fixing prices, the staff submitted extensive data on prevailing prices.

It said it was doing this simply for the information of the commission. But the action suggests that perhaps FPC is going to rely at least in part on prevailing field prices as a factor in determining prices. The Supreme Court (in the Panhandle rate case) has said that FPC can't use the field-price method as its only basis without relating it to costs.

The chart at the top of the preceding page is from one of these field-price exhibits. It purports to be partial justification for using dry-gas costs as the cost of casing-head gas. But the staff said it also shows a close relationship between costs and prices, and a reasonably consistent relationship between the wellhead values of natural gas and crude oil in the same area.

What it means . . . What does this Phillips case mean to gas producers as a whole? Of course Phillips and its customers haven't had their say yet, and there's no way of telling what the commission may decide after hearing all the evidence and arguments.

But on the basis of the way the staff is going at this guinea-pig case, these tentative inferences may be drawn:

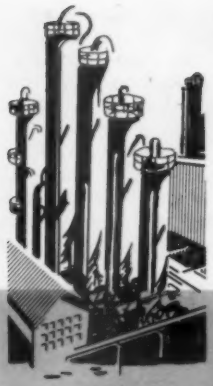
. . . **The cost method,** even at the lowest basis FPC can compute for a presumably efficient company, proves that the general level of gas prices is not excessive.

. . . **Low field prices,** typically old contracts in the Panhandle, will be raised by FPC at least to a level close to representative cost and prevailing area prices.

. . . **A producer can average** off his high and low costs within a particular area, but not his company-wide costs in several regions.

. . . **Some producing costs** are so high that the utility-cost method by itself is obviously unworkable.

. . . **Field prices** prevailing in arm's-length contracts may, after all, become a major factor in FPC's yardstick for determining when producers' prices are above the "just and reasonable" level.



★ PROCESSING

Octane pressure keeps heat on refiners to upgrade

...and here's how 1957 will meet challenge

• ISOMERIZATION may receive its first commercial commitment as a process expressly designed to upgrade motor-fuel components.

• ALKYLATION will grow in use. The year may bring new refinements in this process to reduce operating costs and improve its attraction for refiners.

• HYDROGEN TREATING is well along on a boom program which will carry it to most refineries in the nation. Applied to the upgrading of literally every petroleum fraction, it carries further implications in widening the admissible feed to some other processes. Look for more revelations on the treatment of crude itself, and of residual fractions.

• CATALYTIC REFORMING, now well into its second round of construction in many refineries, will become practically universal in every modern plant in the country. The first combination process units comprising re-treatment of lower-octane reformate fractions will be joined by others as octane pressure remains firm.

• THERMAL PROCESSING, now losing ground, may show some firmness in certain aspects. Thermal reforming and coking may hold interest for refiners for several years to come.

IN the science of petroleum refining, 1957 shows bright promise of new developments. The pace of new building for both quality improvement and outright capacity expansion will hold firm. As octane pressure continues, existing facilities for upgrading antiknock quality will further expand. New process types will make their bows and some commercial "firsts" in this field are expected.

In the long-range picture, 1957 should contribute some new clues to the radical concept of radiation processing. Management's interest in this new field is accelerating. This is reflected in a quickening research effort aimed at learning the basic principles of atomic radiation effects on petroleum hydrocarbons. This is a slow and tedious search. But the stepped-up effort may shed some new light on how this completely new energy source may find use in the refining of petroleum.

While capital expenditures for new process equipment will be directed largely to new facilities for quality improvement, an upturn in basic crude capacity is strongly indicated.

It appears that the cushion on capacity will not be absorbed to any great extent by rising demand. The nation's crude-processing capacity should wind up at year's end with a continuing margin over actual requirements.

Isomerization

The next departure in processing naphtha stock for high-octane blend stocks is generally conceded to entail the isomerization of pentane, hexane, and heptane fractions. In this respect, technical know-how has preceded economics.

Refiners now have available to them a total of six developed processes not including those designed for butane isomerization. To these will probably be added two or three more before the year is out.

The announced processes include: **Isomate**, offered by Standard Oil Co., (Ind.); **Liquid Phase Isomerization,** by Shell Development Co.: **Pentafining,** by Atlantic Refining Co.; **Penex,** by Universal Oil Products Co.; **Isomerate,** by Pure Oil Co., and **Iso-Kel,** by M. W. Kellogg Co.

These established processes now available for licensing range over a variety of techniques. They employ platinum (Pentafining and Penex) another noble-metal catalyst as yet unrevealed (Iso-Kel), a non-noble-metal catalyst (Isomerate), aluminum chloride-hydrocarbon complex (Isomate), and hydrogen chloride (Shell).

These processes are available in a wide variety of processing schemes. Some may be employed in a once-through operation, at least in initial units. But the refiner is offered almost any degree of reactor effulent separation he wishes, for the recycling of unconverted normal paraffins to the reactor.

Separation costs high . . . This phase of the process is giving refiners pause. It is generally conceded that the separation of straight-chain from branched-chain paraffins is a costly operation. By conventional fractionation, it is possible to derive a practical split which need not give high purity to either stream. Even this

entails equipment which can represent 75 per cent or more, of total unit cost. Refiners are loath to embark on such an operation until octane pressure forces the issue. A fair gage for isomerization's initial adoption is said to be the point at which severe catalytic reformng yields drop below 80 per cent.

But the adoption of isomerization may not be limited to such a generalization. Some refiners with existing facilities for splitting reactor effluent streams may find it expedient this year to contract for isomerization unts. The process cannot be fully appraised until it gains commercial usage.

A limited "plus" . . . Isomerization does not offer the same degree of octane relief that refiners have realized from catalytic reforming. It is restricted to a smaller fraction of gasoline. Furthermore, it does not produce the high-research-octane product derived from catalytic reforming. It does, however, give the refiner one more tool for boosting pool octane.

The increasing importance of road octane ratings lends isomerization its greatest advantage today. Isoparaffins, represented principally by isomerate and alkylate, are looming ever more important as compression ratios continue to rise. They are going to be needed in greater quantities to offset the surface-ignition problems characteristic of high-aromatic and olefinic blends resulting from catalytic reforming, catalytic cracking, and polymerization.

The search continues . . . Meanwhile, technical advances in this process type are continuing in many research laboratories. Many catalysts are being investigated. Those permitting the best possible equilibrium conditions for isomerization on a once-through basis will be explored thoroughly. Nonmetal catalysts such as boron trifluoride are under investigation. Those companies with developed processes are continuing their research programs. They will be joined by others during 1957.

Alkylation

Early returns from refiners replying to The Oil and Gas Journal's annual refining survey forms indicate that 1957 will be a big year for alkylate-plant construction. It is still too early to project capacity into 1958, but from all indications, it may well hit 350,000 bbl. per day of alkylate productive capacity.

An interesting aspect of this budding program is the stepped-up participation of the medium and smaller refiner. In the past, alkylation has been used primarily by major oil companies in the aviation-gasoline program. The base is becoming broader with the entry of more small refiners.

Hydrogen Treating

The bullish predictions for this versatile new tool have long since become trite. Hydrogen treating, as it has emerged in today's refining, looks like a workhorse. Total U. S. capacity for all types of units now stands at about 750,000 bbl. per day.

This embraces the upgrading of all types of refinery streams from reformer feed stocks to waxes. Its most prevalent application to date has been in packaged pretreaters installed on catalytic reforming units. This application has had a marked effect on catalytic reforming itself. Desulfurization has admitted many poor-quality feeds to this type of upgrading.

This technique has such a broad potential application that it is conservatively projected to use on 32 per cent of all crude capacity by 1960, and 36 per cent by 1965. Based on estimated future crude runs, this represents total hydrogen-treating operations of about 3,000,000 bbl. per day in 3 years and 4,000,000 bbl. per day by 1965.

Hydrogenation coming . . . Catalytic processing with hydrogen will not remain in the "treating" class, however. Technologists have long foreseen the day when severe hydrogenation or hydrocracking of residual fractions or whole crudes would become economic.

The means for obtaining more high-valued distillates from crude bottoms via the hydrogenation route are already at hand. Gulf Research & Development Co.'s HDS process introduced nearly 2 years ago showed the way for desulfurizing residual fractions and converting them to higher-quality distillates. Humble Oil & Refining Co. and Houdry Process Corp. this past year revealed processes for obtaining essentially the same ends. This year the industry will hear from others on the same matter.

Again, technology has raced ahead of economics. This severe hydrogenation is costly, and must await a greater differential in the prices of distillate and residual products.

Catalytic Reforming

Following a leveling-off in new cat reformer construction, the trend is expected to continue upward again, as many refineries add their second and in some cases, their third units. Capacity today stands about 13 per cent of crude capacity. Judging from the programs of some companies, this relative capacity may rise to a national average exceeding 20 per cent by 1960. Some refineries today have planned new cat reforming capacity which will amount to more than 25 per cent of their projected crude capacity. Others now employ 20 per cent of their crude capacity in cat reforming, including some operations for aromatic chemicals.

Radiation Processing

Some important findings may be forthcoming this year in the still unknown field of radiation processing. Research into the possibilities of using this completely new energy source has been under way for some time.

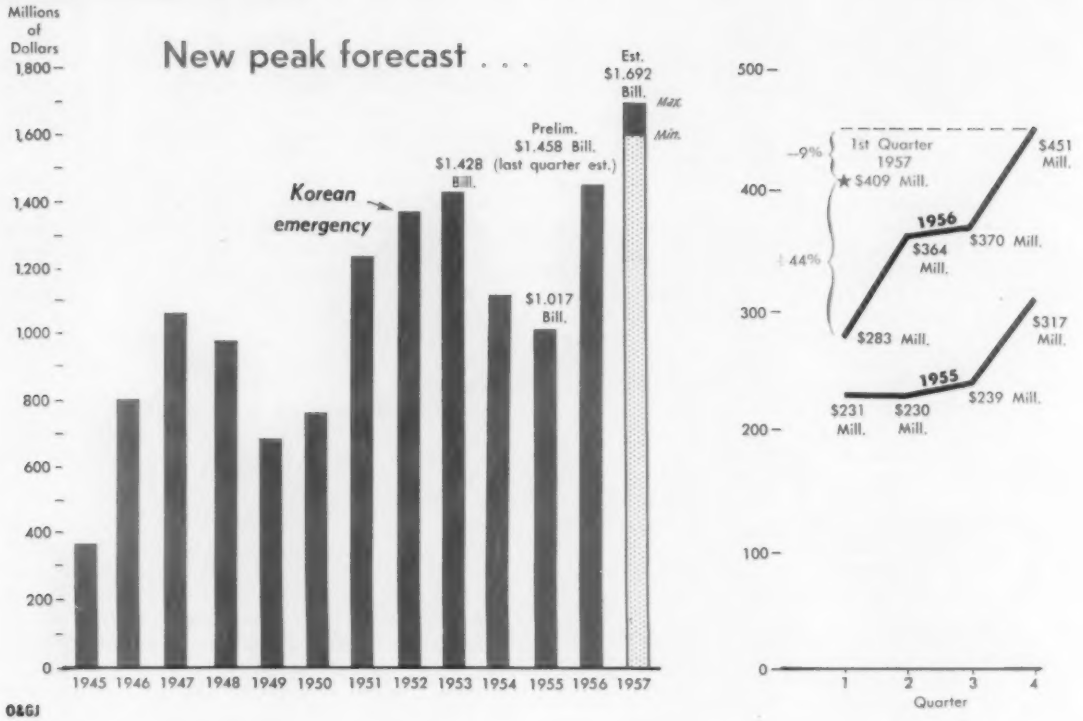
But 1956 brought a startling new concept to light. Previously, refining management had looked on this field with reservations. Radiation costs come high in laboratory work. Translation of possible uses to the vast commercial scale employed in this industry looked remote.

Then came the boom in the reactor program for power purposes, plus a new commercial possibility for the use of radiation. This entails the dual-purpose reactor. This concept holds that reactors built for power can also be designed to utilize the vast radiation energy which is wasted in shielding.

No such reactors are yet being built, or even designed. But authorities in the field believe firmly in their possibility. This raises the sights for commercal uses of radiation on a scale vastly greater than that obtained from radioactive isotopes, particle accelerators, or even waste products and spent-fuel elements.

What may result? Possibly some reactions which are now impossible to initiate by heat and catalysis alone. Possibly a new degree of specificity in controlling hydrocarbon reactions. These are guesses, but they are educated guesses. Millions of dollars are being earmarked in 1957 for this new departure in petroleum research. This year may mark the beginning of a new dimension in the refining of petroleum.

★ PETROCHEMICALS



Ethylene, derivatives still on move

THE 1956 estimated production of petrochemicals sets a new record at above 34 billion pounds with a further rise expected in 1957. In line with the chemical industry over-all, capital expenditures for petrochemicals in 1957 will increase again. Outlook for the whole chemical industry is toward a new peak in capital spending, judging by the large outlays scheduled for the first quarter of 1957. But the rate of increase will be smaller in 1957.

- Some of the large capital expenditures have been going into relatively newer petrochemicals—such as polyethylene. But now a number of the older basics and intermediates are undergoing significant expansion. This group of large-volume petrochemicals includes ethylene oxide-glycol and ethanolamines.
- These developments have sparked a new round of ethylene-plant building. New ethylene projects are under construction or planned from coast to coast.
- There has been intense activity in the synthetic-rubber industry with a consequent sudden, large expansion in butadiene. A leveling off in expenditures in this petrochemical sector is now in order. But the long-term growth prospects for synthetic rubber are good. It is believed that additional synthetic-rubber capacity will be required by 1960.

Chemicals Growth

Petrochemicals as a group have had a distinctly rapid rate of growth. *(For a comparison with chemicals as a whole see The Oil and Gas Journal, September 3, 1956, page 64).* In general, though, petrochemicals tend to follow the chemical industry over-all. A look at the chemical and allied products industry is therefore in order. Estimated chemical sales, based on figures obtainable at year's end, were better than 24 billion dollars for 1956. This dollar volume is a new high and represents a fivefold expansion since 1939.

For 1957, or at least the first 6 months thereof, chemical sales are expected to hold at the last-quarter-of-1956 rate of 2.1 billion dollars per month. The BSDA estimates the chemical production index average at 177 for 1956 (1947-49=100). The index is expected to reach 182 for the first 6 months of 1957. Increase of petrochemical production will likely be at a greater rate than this. Looking still further ahead, estimates are that chemical sales will increase nearly 40 per cent over the period 1955-59 compared with less than 25 per cent for all manufacturing.

Capital Outlays

There was a sharp increase of 45 per cent in capital expenditures for the chemical and allied products industry for 1956 relative to 1955. For this industry a new record was set—3 per cent above the previous high in 1953. For comparison, the corresponding increase for all manufacturing was only 33 per cent.

The chart above summarizes capital outlays of the chemical industry in the postwar years. Note that the peak of 1956 followed the valley of 1955,

resulting in the large percentage gain just cited. For 1957, starting out at an already high level, the percentage gain is expected to be distinctly smaller.

For 1957, The Oil and Gas Journal estimates expenditure for the chemical industry to total close to 1.7 billion dollars. This estimate is based on reports of anticipated expenditures for 1957 coming in during the closing months of 1956. As management looks into the crystal ball these sobering facts stare back: tight money, high labor and material costs, some material shortages. If one anticipates that some of the expansion originally planned for 1957 may have to be deferred until 1958, the estimate of total outlays may be shaved down to about 1.6 billion dollars.

But 1957 seems to be headed for a new record, even though the percentage gain may be a smaller one. This statement is prompted by the estimate of $409,000,000 for the first quarter of 1957 based on reports coming in to the SEC during October and November of last year. This estimate is plotted together with the quarterly trends for 1955 and 1956, enabling the reader to make his own estimate of total 1957 spending.

Ethylene and Derivatives

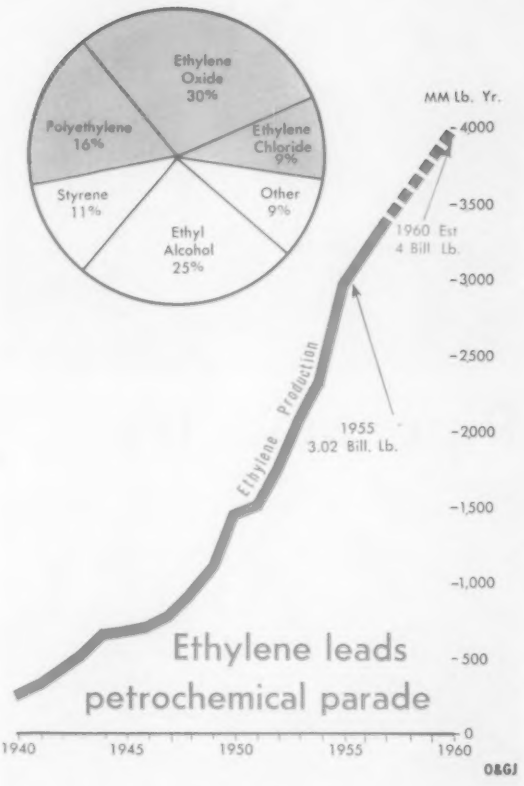
The small chart summarizes ethylene production. Through 1954, ethylene consumption showed an average rate of growth of about 10 per cent per year. Extrapolation of the growth curve through 1954 indicated a production of 3.5 billion pounds by 1960. Following the big jump to 3 billion pounds a year in 1955, earlier estimates on ethylene growth had to be revised. The preliminary estimate for 1956 is 3.2 billion pounds which just about catches up with existing capacity. Beyond that, a new round of ethylene expansion is in progress.

Latest estimates point toward a demand of some 4 billion pounds by 1960. Over 400 million pounds per year of new capacity is due for completion in 1957. And perhaps as much as 500 million pounds annual capacity will be completed in 1958. This latest round of expansion should then be enough to cover the estimated demand to 1960—unless the demand estimate proves too conservative as it has in the past.

The ethylene consumption pie as it was cut up for 1956 is also given in the small chart. Most striking among petrochemical capital expenditure items is that for polyethylene facilities, expansion of which in its latest phase involves some $100,000,000 of new plant. This, together with new expansion in the older ethylene derivatives such as ethylene glycol, is responsible for the big boost in ethylene.

East Coast . . . Esso Standard Oil Co. announced at the end of 1955 that it would build an ethylene plant at Linden, N. J. Carbide & Carbon Chemicals is likely to be building ethylene facilities at Institute, W. Va., since it will be getting "ethane concentrates" through a new pipeline from Equitable Gas Co. at Maytown, Ky.

Gulf Coast . . . Phillips Petroleum Co. at Sweeny, Tex.; Petroleum Chemicals, Inc., at Lake Charles; Esso at Baton Rouge; Humble Oil & Refining Co., at Baytown—all are in the ethylene-expansion picture. These plants will be distributing ethylene to other Gulf Coast ethylene-consuming plants. It will be interesting to see what Gulf Oil Corp. will do about its earlier announced plans to expand again the ethylene facilities at Port Arthur. Magnolia Petroleum Co. is also reported looking into ethylene at Beaumont. And Jefferson Chemical Co. at Port Neches will increase its captive ethylene capacity.



Ohio Valley . . . Commercial Solvents Corp. and Columbia Gas System, Inc., are making economic studies for a joint project in ethylene and ethylene derivatives involving 40-50 million dollars to be located in the Ohio Valley.

West Coast . . . Union Oil Co. is building a 100-million-pound per year ethylene plant at its Wilmington refinery.

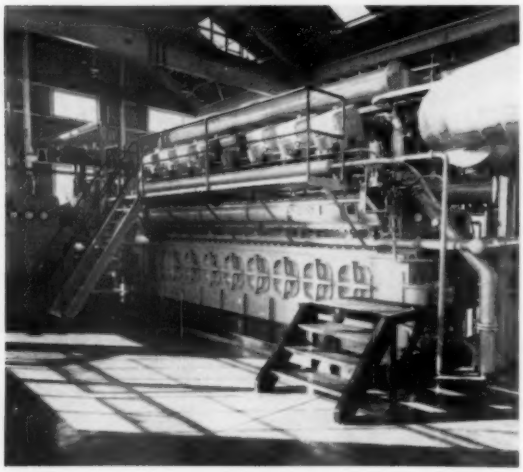
Polyethylene . . . A summing up of the polyethylene situation in 1955 showed that polyethylene capacity in the United States was approaching 600 million pounds per year *(The Oil and Gas Journal, May 9, 1955, page 80)*. This was before low-pressure processes had made their impact. New low-pressure plants with capacities totaling over 400 million pounds per year have been announced. It is estimated that additional high-pressure-process capacity of nearly 300 million pounds yearly will be completed in 1957 and 1958. The outlook to 1960 is therefore a polyethylene capacity of around 1.3 billion pounds.

The strong push for expanded markets was reflected in a 44 per cent gain in polyethylene sales—from 346 million pounds in 1955 to some 500 million pounds in 1956. Discounts on large-quantity shipments, either open or under the table, reflect a reduction of 3-4 cents per pound down from 40 cents for molding grade.

Activity is high in construction of ethylene oxide-glycol facilities with these companies involved: Carbide & Carbon, Jefferson Chemical, Wyandotte, Dow and General Aniline & Film.

Pipelining: It's

moving ahead at



speedy pace . . .

Controls, metering, computers,

THE year 1956 was characterized by expansion and advances in all phases of pipelining. There was, first of all, continued expansion of the pipeline systems themselves, particularly the natural-gas lines, in the face of predictions for a leveling off in construction. There were significant advances in compressor-station and construction equipment, in metering, and in pipe-protection materials. All were aimed at lowering unit transportation costs to solidify the position of pipelines as the most efficient means of transmitting energy.

The significance of the expansion of established natural-gas-transmission companies was underlined by El Paso Natural Gas Co.'s biggest single undertaking in its history. Its 1956 program cost $195,000,000. This was a greater investment than was required for two of the three largest new projects under construction during the year—Pacific Northwest Pipe Line Corp. ($218 million), American Louisiana Pipe Line Co. ($130 million), and Westcoast Transmission Co., Ltd. ($153 million).

The program raised delivery capacity of El Paso's system from Southwest fields to California by 450,000,000 cu. ft. per day, making the system total 2,338,000,000 cu. ft. per day. Compressor horsepower was raised 55,500 to a total of 753,715 hp. El Paso spreads laid all of the pipe in the expansion with the exception of a single spread contracted to Western Pipe Line Contractors, Inc., Austin.

Centrifugal compressors . . . The past year saw increasing acceptance of the centrifugal compressor with various types of drives on natural-gas lines. Acceptance of the centrifugals has resulted from their mechanical simplicity, efficiency, and the fact that they do not develop pulsations.

The centrigugals also are readily adaptable to remote control. The two prototype stations are Gulf Interstate Gas Co.'s Stanton, Ky., installation, which can be completely remotely controlled as a satellite, and Transcontinental Gas Pipe Line Corp.'s station near Houston, having local remote control within the station.

Performance of the gas-engine-driven centrifugals has been such that Gulf Interstate and Transco have ordered additional units for their systems. Of much significance, also, is the fact that they will be used at some of the stations on the Westcoast line, which will be completed this year from Peace River to Washington. This will mark the first time the centrifugals were incorporated in the planning of a new line.

Controls . . . One of the features of centrifugal compressors driven by electric, gas turbine, or engine power has been the possibility of future remote control. The effectiveness of sequence starting controls for gas turbines stimulated application of remote controls to old reciprocating compressors. Northern Natural Gas Co., at its Mullinsville, Kans., station, developed controls for a reciprocating unit. It found that maintenance on the control system, contrary to some existing ideas, proved to be negligible. Automatic startup was applied to a 2,000-hp. vertical internal-combustion gas engine with reciprocating-type compressors.

The control principles also have been applied to a diesel pump station on a products line. A Great Lakes Pipe Line Co. diesel station has been equipped recently with instrumentation for unattended operation.

It will have at the least centralized local control leading to more efficient operations. In the future some stations so equipped will be unattended while others will have a single resident operator on call in case of trouble. This control design is applicable to a large multiunit station.

The advantages of electronic control of a complete system also became evident during the past year. Okan Pipe Line Co.'s L.P.G.-natural gasoline pipeline from the Hugoton, Kansas, field area to Tulsa was the first system controlled entirely by electronics. Controls at the Liberal station are all electronic. Basic control of the main-line units is obtained by a rate-of-flow controller on station discharge. The controller is set for the desired rate of flow and by controller output (through a cathode follower to an electronic servo), the speed of the engine is controlled by a hydraulic governor.

Metering . . . Great strides were made in metering crude oil. The biggest single use of positive-displacement meters in petroleum measurement is on Interstate Oil Pipe Line Co.'s system at Baton Rouge. Ten p.d. meters are handling 275,000 bbl. per day. The meters are justified by increased accuracy alone. They also reduced tankage, eliminated evaporation losses, lowered labor costs, and have not had excessive maintenance.

Development of metering has coincided with a breakthrough for automatic custody transfer of crude oil. A few significant pioneering installations were made by major companies in 1956 and an American Petroleum Institute report is optimistic for its widespread use in the future.

To pipelines it means reduction of gager forces, smaller-diameter gathering lines and stations because loads will be more constant, plus greater reliability, and reduced tankage. Ultimately, in certain ideal situations, leases may be operated entirely without stock tanks, with p.d. meters permitting energy now wasted in wellhead chokes to be used for moving oil through gathering systems—keeping an entirely closed system. Automatic custody transfer provides for gravity measurement, temperature recording, sampling, b.s. and w. monitoring, and meter measurement.

Advances in techniques of handling of high-viscosity crudes have been made by Interprovincial Pipe Line Co. and Minnesota Pipe Line Co. Interprovincial has successfully batched viscous crudes at trunk-line rates. Fosterton crude, which is Newtonian over the anticipated range of operating temperatures (35° to 65°), presents no problem. But the pipeline performances of some other western Canada crudes, being non-Newtonian in the range of operating temperatures, are hard to predict. They would restrict pipeline capacities. Minnesota Pipe Line Co. has been able to meter high-viscosity, high-wax-content oil in cold weather.

Construction . . . Double jointing, an attractive practice for speeding up pipe laying in favorable terrain, made a big comeback. A readily portable double-jointing yard has been designed with hydraulic and electronic equipment to achieve high efficiency. The equipment features hydraulically powered lineup carriage and rollers that start turning pipe automatically when a welder strikes his arc.

It is designed for manual arc welding but is readily adaptable to automatic submerged-arc welding. Double jointing was used on spreads of Westcoast Transmission, Trans-Canada Pipe Lines, Ltd., and Tennessee Gas Transmission Co. A significant advance toward high efficiency in submarine pipelining was made on T.G.T.'s Muskrat line, and from a special pipe-laying barge adaptable to water 25 ft. deep and capable of handling 24-in. pipe. It had three double-jointing stations.

An ingenious ditch-padding machine, the first completely original pipeline construction equipment innovation in years, made its bow. It moves dirt for padding from the backfill of the spoil bank to the ditch so the coated pipe is protected from damage by rocks during backfilling. It cuts the cost of padding the ditch in rocky country. The padder hits the problem directly, simply, and economically.

Another important development was the pneumatic lineup clamp, which makes possible faster lineup of pipe.

Plastic tape of the polyethylene type was applied for the first time on a long, big-inch pipeline-coating job. A 122-mile, 22-in. section from Defiance, Ohio, to Bridgman, Mich., was taped on the American Louisiana pipeline. Taping was accomplished with a smooth, fast application by two spreads and met all inspection requirements. It promises to take its place among the available materials for pipeline protection.

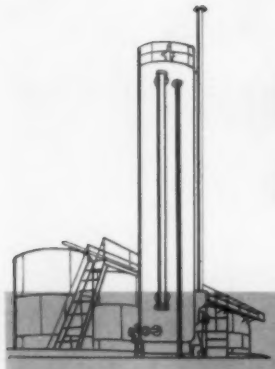
The first application of a new weight coating for submarine pipelines was made on the Southern Natural Gas Co. system. Called Timcote, it is a rubberized asphalt mastic weight coating applied by an extrusion process. Southern Natural interests developed the high-density coating, which is fortified with barite aggregate. The coating has sufficient ductility to avoid cracking troubles experenced on some underwater pipelines. It is applied on the barge.

Computers . . . The use of computers has meant greater efficiency in dispatching on products lines and better use of facilities. After 4 years' study, Great Lakes Pipe Line Co. made a computer the heart of its scheduling. Complete schedules for the next 28 days which formerly required several days to prepare can now be reworked in a few hours. Annual rental for the computer is $86,000. It will be used later to work out engineering and accounting problems as well as scheduling.

An electric analog found its place in design of compressor piping for maximum pulsation control and compressor efficiency. As the result of a 20-company research project, the analog was found to be essential for adequate design. The analog predicts the effect of piping on compressors before installation.

Communications, telemetering . . . Considerable extension of microwave systems was made during the year—both for communications and, particularly in the future, for remote control of stations.

A new concept in telemetering was introduced by Service Pipe Line Co. on its Wyoming crude system. When an upset occurs at a station or there is a line break, an "automatic watchman" sounds an alarm at the central station and alerts the dispatcher to the emergency. Under this operation, information is supplied only when it is significant—and not continuously. This eases the strain on the dispatcher and frees him to concentrate on planning operations. **End.**



Lower drilling costs, new reserves are major goals

1957 will see continuation of these trends

- **TURBODRILL promises to be needed drilling rate increaser, especially in hard formations. Cost will be higher than drill collars, however. Big pumps will be needed.**
- **OFFSHORE DRILLING is expanding rapidly but big investment is necessary. The trend is to more power and deeper drilling rigs.**
- **AUTOMATIC CUSTODY TRANSFER is just getting started. New systems offer lower investment than tankage, save oil and supervision.**
- **NEW SECONDARY-RECOVERY methods can recover more oil. Testing will increase. Immediate application may be limited to "ideal" reservoirs.**

CUTTING costs has been a primary incentive for new developments in drilling and production recently. Another motive has been the need to develop new oil reserves for the industry.

Drilling contractors are faced with either cutting hole cheaper or going out of business unless a major drilling boom increases demand. Oil operators selling at pegged crude prices must find ways to reduce costs to combat rising prices of labor and materials. These are reasons two new developments—the turbodrill and automatic custody transfer of crude—are receiving a lot of interest. And the interest appears well founded.

Other new developments are aimed directly or indirectly at finding new oil sources for a rapidly growing oil demand. In this realm would be the booming offshore development. Significant here is the swelling number of offshore drilling units designed for deeper and deeper water. And, on offshore as well as land units operating in deep basin areas, the number of deep-drilling rigs is rising sharply.

Also aimed at new oil sources are secondary-recovery methods. While the old reliables, water flooding, and gas injection, are increasing throughout the industry and are responsible for perhaps 20 per cent of the nation's production, successful application of some new methods could get even more oil out of the ground. Among these are in situ combustion (fire flooding) and miscible fluid (L.P.G.) flooding.

Turbodrill a big hope . . . Practical field models of the turbodrill have come along when the drilling industry needs desperately to find a way to drill holes faster. The tool is not new in this country. It has been sidelined for 30 years because development cost a lot of money and other, less-expensive, means of improving penetration rate gradually became known. These methods—better drilling muds, higher circulation rates, jet bits, increased weight on the bit through stabilizers and big drill collars—appear to be developed to their ultimate. Year-by-year increases in drilling rates have tapered off. A new method is needed.

State-financed development of the turbodrill abroad has brought it along to the point that it should compete in domestic drilling. Its extensive use abroad has proved the turbodrill for different types of drilling. This is a big selling point in getting the tool put to use here. Several other drilling tools, such as the percussive methods depending in one case on mud powering a turbine and in another case on electric power trans-

New tool holds promise in several applications

mitted downhole, have not been so fortunate. They, too, appear promising in limited tests but have not as yet been used enough to be proved for satisfactory field service.

Best for hard rock . . . In foreign tests the turbodrill has performed best in drilling hard rock. Reports are that rates in the range of 10 times conventional drilling are obtained. Much lower increases are obtained in soft-rock drilling. In this country, competing against the most modern drilling methods, it is doubtful that the turbodrill will improve rates in soft-rock drilling. American tests have been performed in fairly soft formations. At the time they were performed the turbodrill obtained increased penetration rates. But advances such as jet bits and more bit horsepower have pushed

drilling rates beyond those of the turbodrill in soft drilling.

Serviceability . . . Current predictions are that a minimum of three turbodrills will be needed on any rig that is to make maximum use of the tool. One tool would be in the hole, one ready on the rig floor, and one in the shop. Drilling mud is particularly hard on the bearings and guide bushings. Maintenance repairs might not be too costly but may have to be frequent.

Probes new regions . . . Offshore, the drilling business looks good. Participation here requires a huge investment but operators are generally willing to pay the operating costs of 2 to 3-million-dollar drilling units. The prospects of new oil are that good. One out of three exploratory wells have hit production.

The promise of continued expansion of offshore operations has kept barge and platform building yards humming. All appear to be working at capacity. Mobile offshore-drilling units have doubled in number in 1956. Nearly 30 are now in operation.

Equipment on these drilling units is a driller's dream. When several million dollars outlay for a unit is the prospect, nobody argues much about a few hundred thousand for the biggest and best in drilling equipment. Many of the rigs on offshore units can drill to 20,000 ft. or more. Total power on later units

Offshore drilling costs high but rewards are rich

has ranged up to 6,000 hp. Electric drive predominates on later offshore drilling units because of its added flexibility and smooth power application. Its use both here and on land will probably expand because of the availabiliy of standardized diesel-electric traction equipment.

Deeper drilling . . . Perhaps a half-dozen rigs operating in the Gulf Coast, both on land and water, could break the present record drilling depth of 22,570 ft. Several have been rated at 25,000 ft. In addition, there are several more rigs that could drill as deep operating in inland areas. Indications are that there will be plenty of deep drilling for these deep rigs, too. A recent prediction states that wells 16,000 ft. and deeper will increase from 47 in 1956 to 332 in 1965. Wells 18,000 ft. and deeper are expected to increase from 7 to 82 in the same period.

Automation cuts production costs . . . In recent years automation has steadily expanded throughout the producing side of the oil industry. Behind this development is the realization that automatic equipment can cut supervision of operations, reduce the amount of major equipment needed, and improve the lease performance. Examples are clock control of production of both pumping and flowing wells, automatic shutdown of wells in case of trouble, centralized testing facilities, automatic metering and recording of production, automatic tank switchers and gages.

Automation has taken a giant step forward during the past year with the advent of automatic custody transfer. And in the next few it will flourish. Slightly more than 20 automatic-custody-transfer installations are either in operation or are prepared to operate at present. One company, alone, plans at least 25 new units during the current year.

Less investment . . . A big appeal of automatic custody transfer to the producer is the reduction in equipment investment on the lease. Small, compact automatic measuring and testing equipment can replace most of the tankage on conventional leases. Savings are estimated to be from $2,000 on leases pro-

Less equipment needed with automatic custody transfer

ducing 300 bbl. per day to $70,000 on leases as big as 5,000 bbl. per day. When all economic factors are considered, automatic custory transfer may be justified on leases having as small as 50 bbl. per day production.

Can we squeeze more oil from the ground? . . . Even though production from current injection projects is spiraling and amounts to about 23 per cent of total production, a vast amount of oil will be left in place. Ultimate recovery of known oil in place has been estimated to be less than 30 per cent. Recovery from reservoirs subjected to water flooding and gas injection may range from 35 to 70 per cent. Other reservoirs containing low-gravity crude are not easily affected by these secondary-recovery methods and may yield only 10 to 20 per cent of the crude.

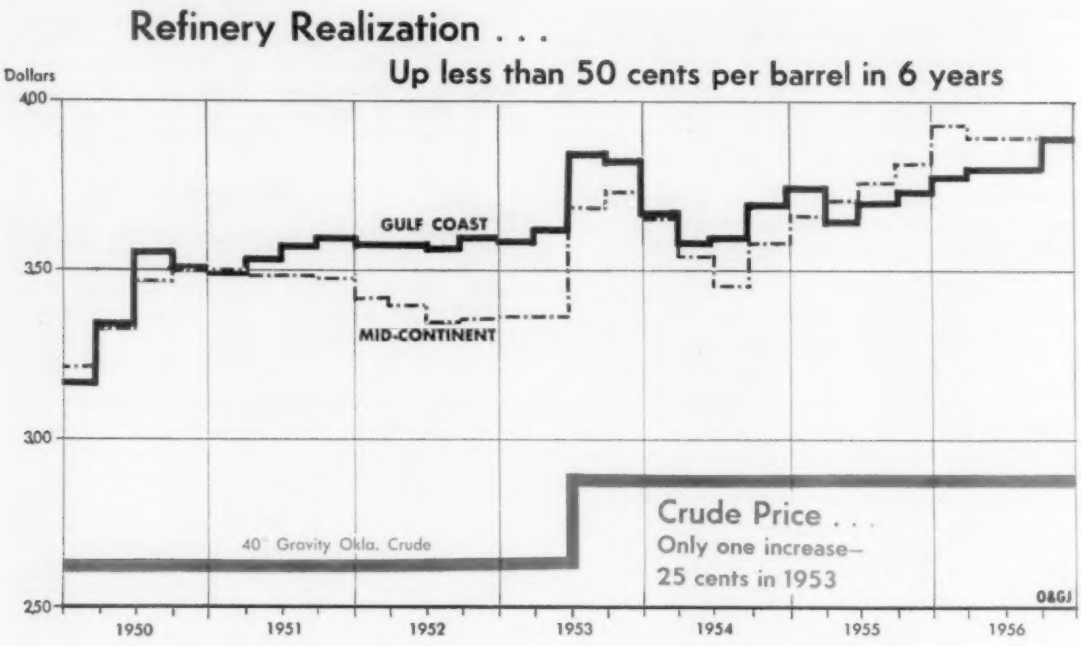
Two methods currently being studied for removing all the oil from the reservoir rock are in situ combustion and miscible-fluid flooding. Experimentation with these methods has been conducted for over 5 years. Just this year, however, active field tests have increased and a number of different companies are participating.

Behavior . . . In a sense the two methods are similar. Each depends on a bank of miscible mobile fluid being built up between the residual oil and a displacing gas phase. With the combustion process, air is fed to a high-temperature front where combustion takes place. Either injected fuel or residual oil is consumed as the front moves through the reservoir, stripping all residual oil from the rock. Heat transfer ahead of the front vaporizes some of the oil and creates the mobile miscible fluid.

One disadvantage of in situ combustion is the fuel requirement. Calculations have shown that an equivalent of perhaps 30 per cent of the original oil in place would be consumed to maintain the process. Still, in reservoirs containing 70 to 80 per cent unrecovered oil, the loss might easily be spared.

Miscible-fluid flooding differs from ordinary gas injection in that the phase that contacts the residual oil is more miscible. Steps in this direction have been high-pressure gas injection, injection of rich gas, and injection of liquified petroleum gas (L.P.G.) followed by gas. When the bank of fluid is completely miscible in both oil and displacing gas, 100 per cent recovery is possible. This would be reduced by areal sweep efficiency.

Even though current tests of these methods look promising, they may not come into common use for some time. Such was the case for water flooding. Holding back the combustion process are satisfactory methods to control the front. Economic solvent flooding depends on complete recovery of the solvent. Reservoir factors are important for both.



Many forces buffeted markets

. . . with gasoline stocks reaching an all-time high

FACTORS that influenced product markets during 1956 varied all over the lot. Some tended to strengthen markets while others acted as depressants. Some products were under greater pressure than others, and the changes varied by districts.

The following are some of the important factors back of the changes that took place last year:

. . . Gasoline stocks were too high throughout the year.

. . . Gasoline octane numbers were raised.

. . . The price spread between regular gasoline and premium was raised at the refinery level.

. . . Some companies started marketing multiple grades of premium gasoline.

. . . Some stability was given the gasoline market on the East Coast during part of the year through price maintenance at service stations by some of the marketing companies. The plan lost out in Massachusetts through court action near the end of the year.

. . . The heating season lasted longer than normal with very cool weather through April.

. . . There were no formal discounts on summer-fill sales of light heating oils on the East Coast during the summer.

. . . Loss of residual consumption during the steel mill strike was not enough to disturb the over-all resid market.

. . . The Suez crisis added to the confusion during the last 5 months of the year.

. . . Sharp increases in tanker rates upset the normal differentials between prices for Gulf Coast and East Coast areas.

The most important single market factor for 1956 was the high level of gasoline stocks and the failure to correct the trend during the first 9 months of the year.

The year opened with gasoline stocks 10,033,000 bbl. higher than the previous year. Comparisons with same dates in 1955 show continuing increases in the surplus. At the end of September, total gasoline stocks showed a gain of 27,780,000 bbl. over 1955. This is the largest annual gain for any end-of-quarter date since the end of World War II. It even tops the 26,000,000-bbl. gain from the end of June 1952 to the end of June 1953.

Gasoline Stocks Up in Third Quarter

Gasoline stocks normally increase in the first and fourth quarters and decrease during the two summer quarters. There have been only 2 years since the end of the war with increases in gasoline stocks for the third quarter. One was in 1952 when stocks had dropped to a minimum by the end of June because of the strike. The other increase was in 1956.

The year 1956 had another record. Gasoline stocks increased 34,265,000 bbl. for the first 3 months of the year—the largest quarterly increase since the end of the war and probably an all-time record.

The result was a weak gasoline market and lower prices. By the end of November, regular gasoline on

Representative price tags

Spot Market Quotations of Leading Suppliers
(Cents per gallon except dollars per barrel for residual)

GROUP 3

	Regular gasoline	Kerosine	No. 2 distillate	No. 6 residual
January	11.00-11.25	10.00-10.25	9.00-9.25	2.06-2.16
February	11.00-11.25	10.25-10.38	9.25-9.38	2.10-2.20
March	11.12-11.38	10.25-10.38	9.25-9.38	2.10-2.18
April	11.25-11.50	10.06-10.28	9.06-9.28	2.01-2.10
May	*11.55-11.85	10.00-10.25	9.00-9.25	2.00-2.10
June	11.62-12.00	10.00-10.25	8.88-9.12	2.00-2.10
July	11.47-12.00	9.94-10.19	8.75-9.00	2.00-2.10
August	11.30-11.85	9.75-10.00	8.75-9.00	2.00-2.10
September	11.25-11.75	9.75-10.00	8.75-9.00	2.00-2.10
October	11.10-11.60	9.90-10.15	8.90-9.15	2.03-2.10
November	10.94-11.50	9.81-10.00	8.81-9.00	2.10-2.18
December	10.75-11.50	10.03-10.19	9.03-9.19	2.30-2.50
Avg.	**11.20-11.62**	**9.98-10.19**	**8.95-9.17**	**2.06-2.16**

GULF COAST

January	11.00-11.25	9.22- 9.44	8.88-9.12	2.10
February	11.00-11.25	9.50- 9.62	9.00-9.25	2.10
March	11.00-11.25	9.50- 9.62	9.00-9.25	2.10
April	11.06-11.31	9.31- 9.50	8.75-9.25	2.10
May	11.25-11.50	9.50	8.75-9.25	2.10
June	11.25-11.50	9.50	8.75-9.25	2.10
July	11.25-11.50	9.50	8.69-9.19	2.10
August	†11.40-11.90	9.12	8.50	2.10
September	11.25-11.75	9.22	8.56	2.10
October	11.25-11.75	9.50	8.75	2.10
November	11.25-11.75	9.56- 9.81	9.06-9.19	2.29-2.39
December	11.25-11.75	9.75-10.25	9.25-9.75	2.38-2.68
Avg.	**11.18-11.54**	**9.43- 9.55**	**8.83-9.11**	**2.14-2.17**

the spot Group 3 market was selling for 10.75 cents a gallon, compared with 11.00 cents at the end of November 1953 following the last crude-price increase.

Higher compression ratios in the newer model cars created a demand for gasoline with better octane ratings. The industry problem was to determine the grades and volumes per grade needed to meet the needs of the market that included cars all the way from those requiring only about 80-octane fuel to the latest high-compression motors that need gasoline of 100 octane.

Sun Oil Co. sampled the motorist's interest in multiple-grade premiums by a process of blending at the pump to produce five grades from regular to super-premium. The program was extended before the end of the year. Others started marketing two grades of premium with a price differential to cover some of the added cost in making the top grade of around 100 octane. Still others raised the octane quality of the single premium to meet requirements of the newer-model cars.

Colder-than-normal weather in the second quarter boosted demand for heating oils in the first half of the year. Total demand for distillate fuels averaged 2,460,000 bbl. daily in the first quarter for a gain of 7.8 per cent over the same quarter in 1955.

The late spring in 1956 resulted in a distillate increase of 18.4 per cent over the second quarter of 1955. Kerosine for the same period showed a gain of 21.8 per cent.

These high demands in the first and second quarters left very little surplus heating oils in storage at the start of the summer. Middle-distillate inventories (kerosine plus distillates) at the end of June amounted to only 119,869,000 bbl. compared with 130,482,000 a year earlier and with 114,509,000 bbl. at the end of June 1954.

The end result of this favorable stock position was smaller-than-normal price reductions on heating oils during the summer months. No formal summer-fill discounts were offered on the East Coast. In the Mid-Continent there was a gradual decline in distillate prices to give an over-all reduction of about 0.5 cent a gallon by midsummer. Spot prices on the Gulf Coast eased by about the same amount.

Even though the weather was slightly warmer than normal in the fourth quarter, light-heating-oil prices were back to previous winter levels before the end of the year.

The Suez crisis added to the demand for heavy fuel at export points on the Gulf Coast. The primary demand in Europe, following the closing of Suez and the pipelines through Syria, was for crude. When crude was not available, Europe wanted residual fuels and distillate fuels. There was little to no call for gasoline, the high-inventory product in this country.

Tanker rates were rising even before the Suez closing. After the closing, rates moved still higher. Gulf-East Coast rates for a dirty tanker were equal to the Maritime Commission schedule with no discounts nor premiums early in March.

It cost about 43.8 cents a barrel to move residual fuel from the Gulf to East Coast ports. By the end of the year costs had climbed to USMC plus 225 per cent or about $1.43 a barrel.

Competition between heavy fuel and coal on the East Coast tended to set a ceiling on prices that could be charged in this high-demand area. On the other hand, scarcity of heavy fuel on the Gulf Coast had attracted high-cost material from inland refineries. Quoted prices on the Gulf Coast plus tanker transportation to the East Coast resulted in a laid-down price that was so high that spot material could not compete with coal. The result was that most of the movement was against contracts made earlier in the year.

At the end of the year, fuel and crude markets were strong, but refiners were facing the start of the low-demand season for gasoline with motor-fuel stocks about 20,000,000 bbl. above the desirable working level.

No general crude rise came during year

. . . only minor ups and downs

Despite additional evidence of increasing costs in the finding and production of crude oil, there were no general advances in domestic posted prices during 1956.

In this country the higher-gravity grades, with minor exceptions, had the same postings at the close of the year that they had at the start. There have been no general advances in domestic crudes since June 15, 1953, when a 25-cent per barrel increase became effective.

A 13 per cent increase in imports of crude oil and products, according to many market students, was responsible for an oversupply situation resulting in excess production of gasoline and some other light products over most of the year. This brought about refinery realizations which did not justify the needed general crude price advances for those who find and produce domestic crudes. Conditions at the end of the year, due to increased crude-oil and products demands

resulting from the Middle East crisis, pointed to higher domestic postings in early 1957.

The year, however, did bring both advances and reductions at scattered points, reflecting changes in supply and demand of local and regional significance.

The advances in posted prices for low-gravity crudes in several areas were particularly important. This trend got under way early in the year due to improvement in markets for residual fuel oils.

Following the shutdown of the Suez Canal and the pipelines connecting northern Iraq fields to the eastern Mediterranean terminals, the shortage of residual fuels in this country and the Western Hemisphere became more pronounced. Substantial advances in the lower-gravity crudes resulted in California and several fields in other parts of the country.

Other crude-price adjustments were brought about by competitive conditions reflecting new sources of supply, transportation advantages, or developments in processing values.

During the summer months postings were reduced 7 cents per barrel in fields located in North and Central Texas and the Texas Panhandle. The reductions were due to higher transportation costs in the affected areas compared to those of adjoining areas. Changes in processing values were also a factor.

A 10-cent reduction in Illinois basin crudes was generally credited to competitive conditions in that general area and also to western Canadian crude oil delivered to Sarnia, Ont.

Pennsylvania Grade crude oils continued the price improvement of 1955 brought about largely by stronger domestic and export markets for lubricating oils. In five advances Bradford crude, the highest-priced of the Pennsylvania grade crude oils, increased from $3.55 at the start of the year to $4.68 on August 16, the last change in posting for 1956.

Foreign crude oils . . . In general, changes in postings for crude oil and spot sales outside the United States followed the trends established in this country. Shortages in tanker transportation were also a price factor. The middle and higher-gravity crudes, except for isolated cases, were unchanged during the year. But the low-gravity crudes were stronger and higher prices became effective both in spot sales and in the regular postings in Venezuela, particularly after the Middle East crisis created crude and fuel-oil shortages.

The following table gives the principal price changes in crude market for 1956. In some cases the changes become general in the fields and areas concerned over a period of several days or weeks after the initial new posting was announced. On the dates shown the changes were effective for one or more companies. Changes are in dollars per barrel of 42 American gallons.

Price changes in U. S. and in foreign markets

FEBRUARY 1: Gravity scale with top price of $2.83 for 40° and above made effective in Denver-Julesburg, Colorado, field.

FEBRUARY 6: Bradford, Pennsylvania, crude oil advanced 15 cents to $4.00. Other 1956 advances were: March 16, $4.20; May 16, $4.45; July 16, $4.57; August 16, $4.68. Other lower priced grades of Pennsylvania Grade crudes advanced same dates in varying amounts.

FEBRUARY 7: California crude oils of 25° gravity or lower advanced 1 to 5 cents. Maximum advance of 5 cents was in crudes of 14° gravity and below.

APRIL 17: South Central Texas crudes shifted flat price of $2.79 to 2-cent gravity schedule with price of $2.83 for 40° and above.

JUNE 1: Wyoming sweet crude reduced from $2.90 to $2.83 for 40° and above with 2-cent differential scale for lower gravities.

JUNE 14: Illinois basin crudes reduced from $3.00 to $2.90 and Plymouth, Illinois crude from $2.67 to $2.57.

JUNE 15: Lance Creek, Wyoming crude reduced 7 cents.

JUNE 28: Low-cold-test Gulf Coast Texas crudes advanced 10 cents. South Texas (Mirando type) advanced 15 cents.

JULY 1: West Central Texas crudes reduced from $2.90 to $2.83 for 40° gravity and above with 2-cent differential scale for lower gravities.

AUGUST 4: Several fields in North and Central Texas reduced 7 cents.

OCTOBER 5: Flat price for Arkansas, Mississippi, and North Louisiana distillates reduced 5 to 10 cents. All South Louisiana distillates reduced 10 cents.

NOVEMBER 19: Most grades of California crude of 36° gravity and lower advanced 1 to 40 cents. Maximum advance applied to crude of 14° gravity and below. Smaller advances in higher gravities on graduated scale.

NOVEMBER 29: Oregon Basin, Wyoming, crude advanced from $1.75 to $1.85; Hidden Dome, Wyoming, from $1.65 to $1.85; Hamilton Dome, Wyoming, $1.75 to $1.85.

DECEMBER 1: Wyoming and Montana sour crude advanced 1 cent for 35° gravity to 40 cents for 15° gravity.

FEBRUARY 2: Creole Petroleum Corp. reduced Jusepin, Venezuela crude 8 cents to $2.72.

FEBRUARY 10: British Petroleum Co., Ltd., reduced Iraq crude oil for export at Fao, Persian Gulf, 5 cents to $1.87 and advanced Iraq crude at Tripoli, Lebanon, and Banias, Syria, 10 cents on Mediterranean to $2.49.

FEBRUARY 11: Arabian crude oil delivered to Sidon Lebanon, by pipeline advanced 10 cents to $2.46.

MARCH 1: Pembina Cardium, Alberta, Canada, crude advanced 3 cents to $2.32, with adjustments upward in several small fields. There were no general price changes during the year in the principal Alberta fields. New fields were added to the pricing schedules with postings reflecting quality of crude and transportation costs.

JULY 1: Virden, Mississippian, and Woodnorth, Missippian, Manitoba, Canada, advanced 3 cents. New price for Virden $2.39 and Woodnorth, $2.28.

JULY 12: Creole Petroleum Corp., advanced Tia Juana, Venezuela, crude 10 cents to $2.62.

NOVEMBER 21: Creole Petroleum Corp. advanced Lagunillas heavy crude 15 cents to $2.20; Bachaquero, 15 cents to $2.05; Quiriquire, 14 cents to $2.35; Temblador, 16 cents to $2.21.

NOVEMBER 23: International Petroleum Co. Ltd., advanced Cabimas, Venezuela, 5 cents to $2.10 for 20° gravity and Bachaquero and Lagunillas, Venezuela, crudes 15 cents. New price for Bachaquero heavy is $2.01 and Lagunillas $2.20.

NOVEMBER 30: Richmond Exploration Co. (Standard Oil Co., California) advanced Bajo Grande, Venezuela, crude 20 cents to $1.72.

DECEMBER 1: British Petroleum Co., Ltd., withdrew quotations on Iraq crude at Tripoli and Banias until further notice because of shutdown of northern Iraq pipelines.

DECEMBER 8: Arabian crude oil delivered to Sidon, Lebanon, by pipeline advanced 23 cents to $2.69. Arabian crude oil at Ras Tanura was posted at $1.97 throughout 1956 by Socony Mobil Oil Co. Inc.

DECEMBER 27: Creole Petroleum Corp. advanced Lagunillas heavy crude 13 cents to $2.33; Bachaquero, 13 cents to $2.18; Quiriquire, 5 cents to $2.40, and Tia Juana heavy, 4 cents to $2.12. Several other fields advanced varying amounts.

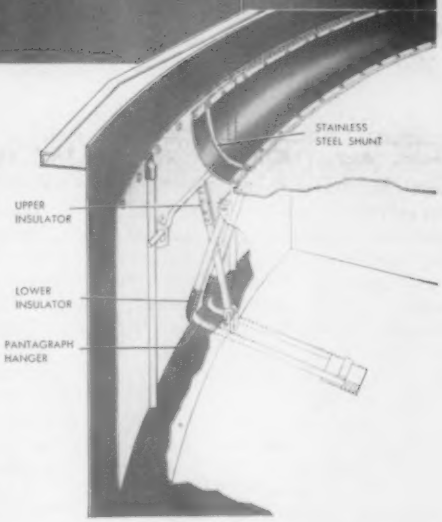
DECEMBER 28: Richmond Exploration Co. (Standard of California) advanced Bajo Grande, Venezuela, crude 13 cents to $1.85.

NEW Insulated Pantagraph Hangers available with HORTON FLOATING ROOFS provide virtually Lightning Proof Protection

A new pantagraph hanger, designed by CB&I for use with the Horton® Seal, has a large number of shunts spaced equally around the roof above the seal fabric. The underseal hangers are insulated so that the current induced by lightning must pass through the shunts. This eliminates the possibility of sparks in the rim space. Ignition cannot occur when lightning strikes on or near the tank.

All floating roofs have a rim space which may contain a flammable mixture. The important thing is to avoid a source of ignition in the vapor space. The new CB&I design of shunts and insulators eliminates the possibility of ignition by lightning-induced sparks. Now you can have lightning protection in addition to proven safety from exposure fires.

Horton Seals equipped with CB&I's new insulated pantagraph hangers are available on Horton Double-Deck, Pontoon and Pan Floating Roofs. Complete information, estimates or quotations may be obtained by writing our nearest office.



Cutaway view of a Horton Seal with new insulated pantagraph hanger designed to provide virtually lightning proof protection. Insulation on underseal hangers prevent lightning induced currents from passing through them and large area stainless steel shunts carry currents from the floating roof across the fabric and to the tank shell.

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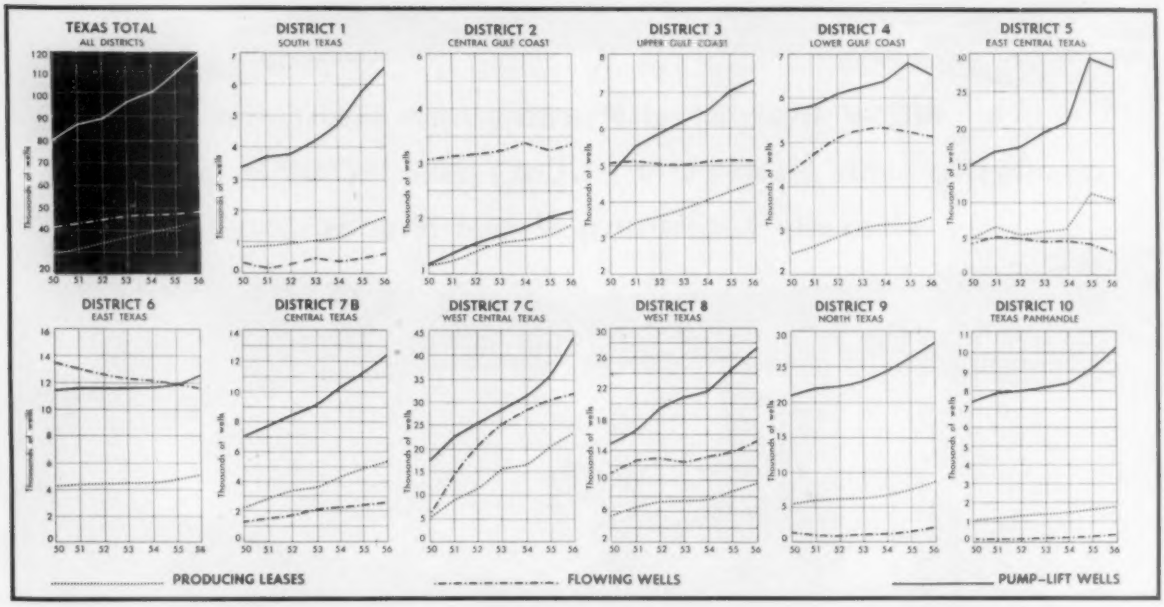

Artificial lift in '57

29,512 wells to go on pump

INCREASING drilling activity and near-record completion of oil wells will result in a new high in wells put on pump in 1957. The 29,512 new artificial-lift completions forecast this year represent an increase of 2,092 over last year's forecast. The new high also follows a trend of rising artificial-lift completions established during the last 4 years. Since 1952, average increase in wells put on pump has been about 7 per cent yer year.

The estimate includes both new pumping wells and old flowing wells to be converted to pump during the year. Although many of the new completions of oil wells are put on pump initially or during the year, those that remain as flowing wells increase the number of new pumping wells in later years when converted. A continuously high number of oil-well completions during the past few years is therefore having a sustaining effect on the number of new pumping wells each year.

This trend, the continually rising number of wells going on pump each year, is also resulting in more total pumping wells. An example of this may be seen in the total Texas pumping wells over the last 6 years, above. Texas pumping wells represent about a fourth of the total pumpers in the United States.

Leading states . . . States contributing the most pumping wells during the year will be Texas, Oklahoma, Kansas, Illinois, California, and Louisiana. These were also the states leading in total number of new oil-well completions during the past year. Forecast drilling activity for 1957 indicates that oil-well completions and therefore pumping wells will remain highest in these states this year.

Texas wells will be mainly responsible for the increase in new pumping wells this year over last year. The number going on artificial lift for the first time is about 2,000 more than last year. This is influenced by a new high in oil-well completions of over 13,000 last year. Drilling activity in Texas will be even higher.

Changes in new pumping wells will not be very great in the other leading states. Each is expected to have a small increase in drilling activity. Louisiana which, next to Texas, will have the most increase in activity, will probably not gain in the number of new pumping wells. Much of this increase in activity is slated for the southern part of the state and offshore where most completions will be flowing.

Distribution of new pumping wells in the older parts of the oil country will be about the same as last year.

1957 Scoreboard

State—	To go on pump
Alabama	31
Arkansas	398
California	1,780
Colorado	278
Illinois	1,935
Indiana	259
Kansas	2,310
Kentucky	820
Louisiana	1,710
Michigan	148
Mississippi	139
Montana	183
Nebraska	285
New Mexico	925
New York	218
North Dakota	120
Ohio	558
Oklahoma	4,470
Pennsylvania	263
Texas	12,140
Utah	56
West Virginia	78
Wyoming	402
Others*	6
Total U. S.	**29,512**

*Includes Arizona, Florida, Georgia, Idaho, Maryland, Missouri, Nevada, Oregon, South Dakota, Tennessee, Virginia, and Washington.

THE *pump* IS THE *heart* OF OIL PRODUCTION

Sargent BUILDS THE BEST PUMPS

SALES and SERVICE

CALIFORNIA Long Beach, Bakersfield, Santa Maria, Ventura, Taft, Huntington Park

OKLAHOMA Oklahoma City, Pawhuska, Seminole

TEXAS Odessa, Snyder, Fort Worth, Houston, Sundown, Wichita Falls, Quitman

NEW MEXICO Hobbs

KANSAS Chase, Russell

ILLINOIS Grayville

ARKANSAS Magnolia

COLORADO Rangely

Sargent pumps are the heart of the oilwell producing industry. Sargent builds every API designed pump with metals to fit any and all well conditions, plus a highly efficient rodless bottom hole hydraulic pump.

The responsibility of the oilfield operator is to economically produce oil. Sargent's thirty-six years of experience in building deepwell pumps, qualifies the statement that Sargent builds the pump to do the job.

Sargent provides the most complete service facilities in the industry by company trained experts in the heart of the oilfields through Sargent operated field stores.

Sargent pumps give you more for your money because they are the best pumps built anywhere.

"GOOD WILL" is the disposition of the pleased customer to return to the place where he has been well treated.

— U. S. Supreme Court

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Does Reed make a Super Shrink-Grip tool joint with 18° shoulders?

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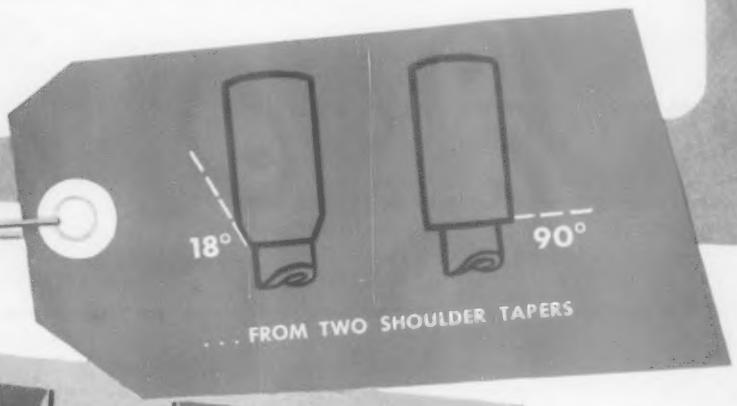
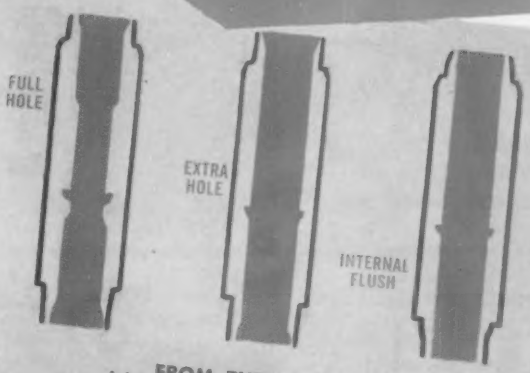


. . . FROM TWO SHOULDER TAPERS



. . . FROM THREE BORES*

*Counterbore Weld tool joints are offered also in A.P.I. Regular bore.

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and engineering advantages of Reed Tool Joints. Reed Roller Bit Company, Houston, Texas.

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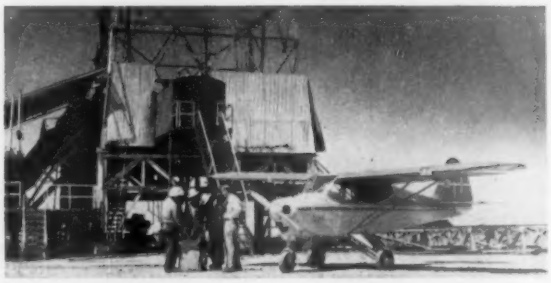
All branches of industry report

Drilling-Producing . . .

$3,600,000,000

"Big push for new reserves. No spot in the U. S. will be overlooked in the search. This will take more wells and deeper drilling."



Refining . . .

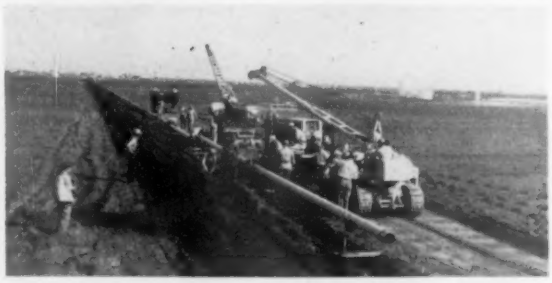
$931,000,000

"New processes available for higher-octanes, better products. And equipment modernization, bottleneck removal."

Transportation . . .

$256,000,000

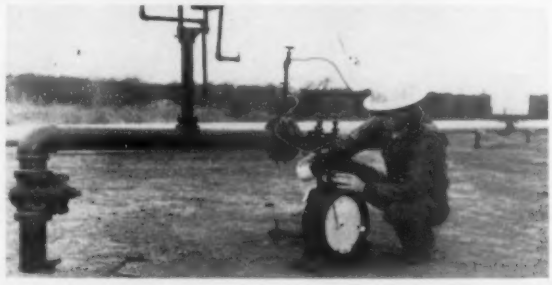
"New systems. New laterals. Loops and increased pump stations to add throughput capacity. Automatic controls. Scheduling."



Natural gas . . . Gas pipelines

$750,000,000

"There are still long standing lines of customers for the premier fuel. New lines, added loops, and more capacity needed."



Marketing and other

$463,000,000

"New boom in filling stations, distributor facilities, terminals, product deliveries. Reason: More people. More cars. More trucks."

sizable budget increases for expansion

THE United States oil-gas industry for 1957 has budgeted a whopping $6,000,000,000 for capital expenditures. This represents an 8+ per cent increase over last year's estimated plant and investment expenditures.

The Journal's survey of 1957 capital expenditures has been made separately for drilling-producing, refining, marketing, and transportation. The same procedure is used as in former years; we polled a representative number of companies operating all over the United States, as to their estimated capital-expenditures budgets. These budget figures were sent to the Journal, on a confidential basis, to be used in calculating the sum total for the entire U. S. industry. Calculations were projected to 100 per cent by using net crude-oil production, refining throughputs, sales of petroleum products by each of the companies involved, etc.

Where the money will go . . .

as revealed by the Journal survey

(In millions of dollars)

Industry division—	1957	1956
Drilling-Producing	$3,600	$3,000
Refining	931	850
Transportation	256	210
Marketing and other	463	411
Gas utilities-Gas pipelines	750	1,205
Total U. S. oil-gas industries	$6,000	$5,676

Industry Statements

Forecasts for 1957 activity in drilling-producing, refining, pipelining, and marketing have all been optimistic. Company president after company president has noted the large volume of business the industry is facing for 1957 and following years. Demands for new equipment, plant facility replacements, extensions, and expansions will be very large this year. The following are representative statements from some of the oil concerns:

Standard Oil Co. (New Jersey) has announced plans to spend $1,250,000,000 in 1957 for capital investment and other expenditures in the search for oil and gas. This billion and a quarter represents a 20 per cent increase of expenditures by Jersey and its consolidated companies over 1956. About 80 per cent of the 1957 total will be spent in the Western Hemisphere where Jersey does the major share of its business.

These totals do not include the expenditures of nonconsolidated companies in which the company has 50 per cent ownership or less. Jersey's share of these expenditures, primarily in the Middle and Far East, would amount to about $130 million in 1957, an increase of approximately 15 per cent over 1956.

Eugene Holman, Jersey Standard board chairman, reports the company has programed this record sum in the expectation that not only will 1957 be a better business year than 1956, but also because his company believes that the world stands on the threshold of an "era of oil energy" extending many years into the future. Holman revealed that in addition to the expenditures planned for 1957, "our company has spent, in the 11 years since the end of World War II, more than $7,000,000,000 for capital investments such as refineries, pipelines, tankers, producing wells, research and other facilities, and for other expenses in searching for the oil and gas demanded by an energy-hungry world."

Sun Oil Co. will continue to spend record sums for expansion and modernization in 1957. Its planning is based on the assumption of a continued high level of economic activity.

Robert G. Dunlop, president of Sun, recently issued the following statement: "In 1956, the United States oil industry supplied more crude petroleum and products to more consumers than in any previous year. And in 1957, oil companies will have to produce, transport, refine, and market even more oil to keep pace with the steady climb in demand.

"The oil industry in 1956 expanded all phases of its activities. Because of this expansion, capital expenditures by oil companies in the U. S. in the year just past represented an all-time high of $5.6 billion, excluding lease bonus payments. Typical of the industry's dynamic growth is the fact that in 1956 almost 59,000 wells were drilled—a record number for a single year.

"In 1957, it is expected that capital expenditures will exceed those of 1956 by roughly 8 per cent." New records in operations are also predicted, and every company within the industry will face stiff competition just in keeping in step with the pace of progress. "And," Dunlop continued, "oil-company earnings in 1956 surpassed 1955, placing the industry in a stronger financial position to carry out the extensive expansion programs planned for 1957."

Standard Oil Co. (Ohio) . . . Clyde T. Foster, president, made this statement as 1957 opened:

"The petroleum industry is confident that the future is bright. More than $6 billion will be spent on new facilities in 1957. This record-breaking expansion will be needed to help meet the growing future demand for petroleum products. The national road program passed by the last Congress will be under way in 1957 and the next few years will see a rapid increase in our network of major highways. This new highway expansion should relieve many of the bottlenecks in our present system and make it possible to increase the use of the 54.3 million cars now owned by the motoring public."

On all business . . . Chase Manhattan Bank, New York City, has this to say (via its Economic Research Department):

"Business activity is again approaching the limits set by manpower, materials, and plant capacity.

"The number of people at work has grown by the remarkable figure of 2 million in a year. Unemployment is down to 3.3 per cent of the labor force. Steel mills are running at a rate slightly above theoretical capacity, and new orders are pouring in.

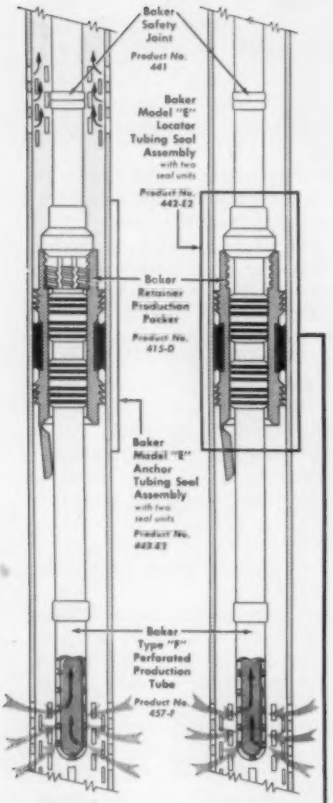
"The major impetus for expansion continues to come from the investment sector. Business men recently have been investing in new plant and equipment at a $38 billion rate. That's $6.5 billion (20 per cent) more than the rate a year ago."

SINGLE ZONE

DUAL ZONE
PRODUCTION

WITH **1** **BAKER**

RETAINER
PRODUCTION PACKER


Baker Safety Joint
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Product No. 442-E2
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Baker Model "E" Anchor Tubing Seal Assembly with two seal units
Product No. 442-E3
Baker Type "P" Perforated Production Tube
Product No. 457-F
TYPICAL DUAL ZONE HOOKUP
TYPICAL SINGLE ZONE HOOKUP

Right: Picture shows actual detail of seal units

Do you know that with only ONE Baker Retainer Production Packer you can equip your well for *either* SINGLE ZONE or DUAL ZONE production? And that you can accomplish *any* type of completion for *any* method of production to meet *fixed* or *changing* well conditions?

A single Baker Retainer Production Packer will also outperform many specialized tools when used as a TESTING PACKER • SQUEEZE PACKER • GAS LIFT PACKER • PERMANENT COMPLETION PACKER • WATER FLOOD PACKER • GAS INJECTION PACKER • CORROSION CONTROL PACKER • TUBING ANCHOR • ONE-WAY BRIDGE PLUG • PERMANENT BRIDGE PLUG.

Every production man should be familiar with the many operating advantages of this "Universal Type" Packer, which include . . .

WIRE LINE SETTING • SETTING UNDER HIGH PRESSURE • NO EXCESSIVE "SET-DOWN" WEIGHT OR TENSION • HOLDS PRESSURE FROM ABOVE OR BELOW • PACKS-OFF AND HOLDS UNDER HIGH BHT • RESISTS CORROSION • EASILY DRILLABLE.

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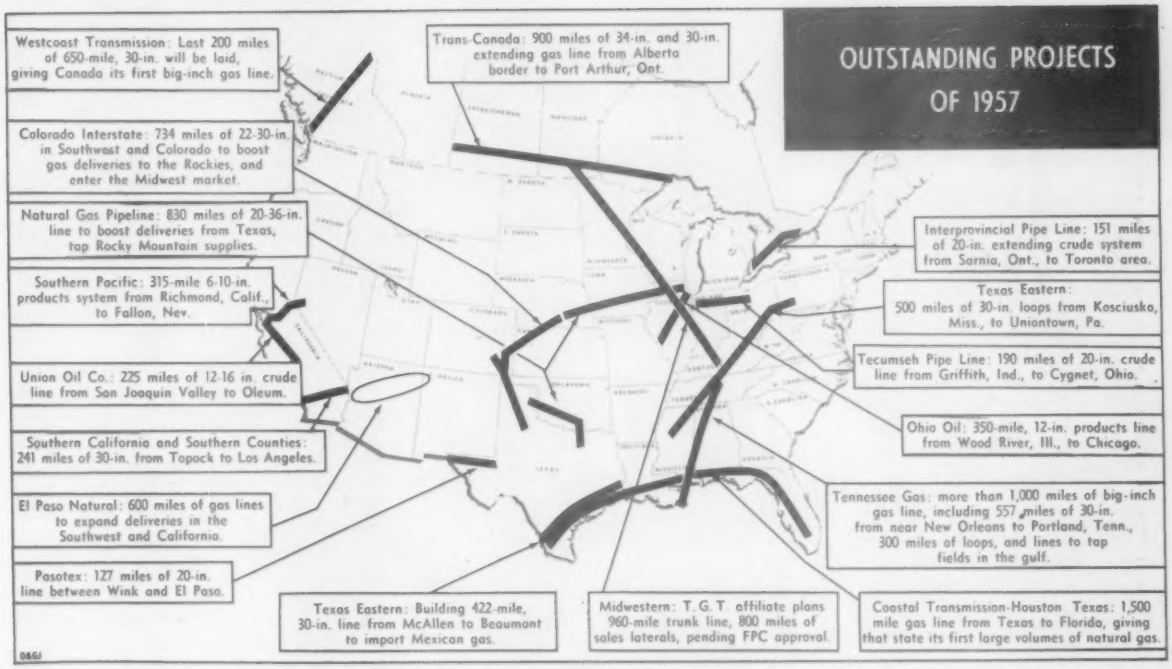

OUTSTANDING PROJECTS OF 1957
Westcoast Transmission: Last 200 miles of 650-mile, 30-in. will be laid, giving Canada its first big-inch gas line.
Trans-Canada: 900 miles of 34-in. and 30-in. extending gas line from Alberta border to Port Arthur, Ont.
Colorado Interstate: 734 miles of 22-30-in. in Southwest and Colorado to boost gas deliveries to the Rockies, and enter the Midwest market.
Natural Gas Pipeline: 830 miles of 20-36-in. line to boost deliveries from Texas, tap Rocky Mountain supplies.
Southern Pacific: 315-mile 6-10-in. products system from Richmond, Calif., to Fallon, Nev.
Union Oil Co.: 225 miles of 12-16 in. crude line from San Joaquin Valley to Oleum.
Southern California and Southern Counties: 241 miles of 30-in. from Topock to Los Angeles.
El Paso Natural: 600 miles of gas lines to expand deliveries in the Southwest and California.
Pasotex: 127 miles of 20-in. line between Wink and El Paso.
Texas Eastern: Building 422-mile, 30-in. line from McAllen to Beaumont to import Mexican gas.
Midwestern: T.G.T. affiliate plans 960-mile trunk line, 800 miles of sales laterals, pending FPC approval.
Coastal Transmission-Houston Texas: 1,500 mile gas line from Texas to Florida, giving that state its first large volumes of natural gas.
Interprovincial Pipe Line: 151 miles of 20-in. extending crude system from Sarnia, Ont., to Toronto area.
Texas Eastern: 500 miles of 30-in. loops from Kosciusko, Miss., to Uniontown, Pa.
Tecumseh Pipe Line: 190 miles of 20-in. crude line from Griffith, Ind., to Cygnet, Ohio.
Ohio Oil: 350-mile, 12-in. products line from Wood River, Ill., to Chicago.
Tennessee Gas: more than 1,000 miles of big-inch gas line, including 557 miles of 30-in. from near New Orleans to Portland, Tenn., 300 miles of loops, and lines to tap fields in the gulf.
0461

A glance at these highlights, plus an improved pipe outlook, shows why . . .

Pipeliners see '57 as 24,000-mile year

A RECORD amount of pipe went into the ground last year, in spite of the steel strike, and an even bigger construction year is indicated for 1957.

Spurred by 12,600 miles of natural-gas construction, highest on record, the total completed in the U. S. and Canada reached 18,100 miles. One-sixth of the mileage was laid in Canada. The world total of 22,900 miles was another new high.

And all signs point this year to an increase in all categories for the United States and Canada. A survey by The Oil and Gas Journal indicates the following breakdown for 1957:

. . . **Natural gas**—13,000 miles.

. . . **Crude**—3,000 miles .

. . . **Products**—3,500 miles.

Foreign construction appears likely to hold steady at around 4,700 miles, which would boost the world total to 24,200 miles, another record. Materialization of a few of the major crude projects proposed in the Middle East, Europe, and South America could cause a sharp upturn in foreign construction.

Back of this optimistic picture is an improved pipe outlook. Although mills cannot come close to meeting the potential demand, increased output is assured by expanded capacity and long-term labor contracts guaranteeing freedom from strikes.

Natural Gas

United States . . . Two projects of great significance to the industry feature 1957 construction. They involve importation of gas from Mexico and Canada.

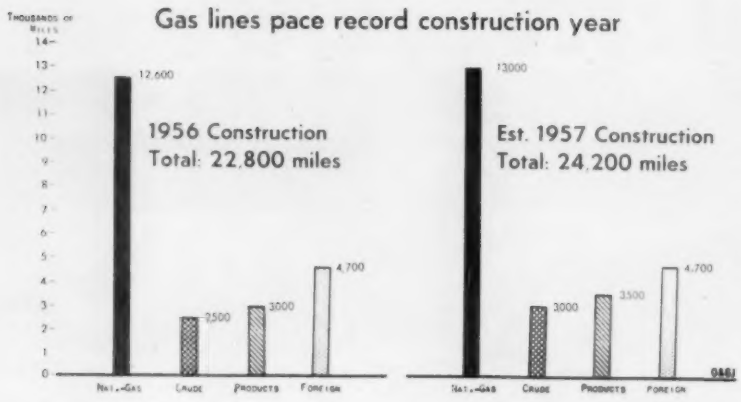
Texas Eastern Transmission Corp. has finally won approval and started its line from McAllen, Tex., near the Mexican border, to Beaumont. The main line will be 422 miles of 30-in., with the 707-mile program also including 45 miles of 24-in. to Provident City, Tex., 77 miles of 30-in. loop between Kosciusko, Miss., and Uniontown, Pa.; and 147 miles of laterals. Additional projects now before the FPC could swell the company's program from the present 707 miles to 1,160.

Tennessee Gas Transmission Co. has before the Federal Power Commission proposals to build more than 1,000 miles of lines. T.G.T. plans 557 miles of 30-in. from below New Orleans connecting the new Muskrat line with its main system at Portland, Tenn., where it would deliver gas to an affiliate, Midwestern Gas Transmission Co. T.G.T. also has scheduled 120 miles fo 12-26-in. line to offshore fields and more than 300 miles of 24 to 30-in loops along its present system.

Midwestern, if granted FPC approval, will build a 1,760-mile system from Portland to the Canadian border to import gas from Trans-Canada Pipe Lines, Ltd., at Emerson, Man. The scheme to bring Gulf Coast and Canadian gas into the Midwest is the focal point of a market tug of war involving half a dozen of the nation's major transmission companies.

Natural Gas Pipeline Co. of America proposes increased deliveries to the area through 389 miles of 36-in loops along its system from Beatrice, Neb., to Chicago, to take gas from Colorado Interstate Gas Co. It also plans 91 miles of 30-in. loops and 350 miles of 20 and 26-in. trunk line from Jack and Wise counties, North Texas, to its present system at Fritch, Tex.

Colorado Interstate would build 734 miles of pipelines, including 345 miles of 30-in. from Kit Carson, Colo., to Beatrice, to serve Natural. Also planned



are a 215-mile 26 and 34-in. loop from the Texas Panhandle to Kit Carson, a 100-mile, 24-in. line from Springfield to Pueblo, Colo., and lines to tap Oklahoma and Kansas fields.

Northern Natural, now engaged in a 354-mile program, proposes a 1,100-mile, 26-in. line from Montana to Minneapolis to transport gas from Alberta fields, where 105 miles of 20 and 24-in. would be laid.

More than 1,000 miles of gathering lines and laterals are being laid this year by Pacific Northwest Pipeline Corp.

The McAllen, Tex.-Miami line to give Florida its first big taste of natural gas could add 1,525 miles of 24-in. line and more than 1,000 miles of laterals to the construction total the next 2 years. This project is planned by Coastal Transmission Corp. and Houston Texas Gas & Oil Corp. to crack the last major U. S. market unserved by natural gas.

El Paso Natural Gas Co. which is winding up 338 miles of 34-in. from the San Juan and Permian basins to the California border, will lay 888 miles of gathering and main lines this year.

Southern California Gas Co. and Southern Counties Gas Co. of California have 241 miles of 30-in. under way between Los Angeles and Topock, Ariz., to handle increased deliveries from El Paso. Pacific Gas & Electric Co. is laying 135 miles of 34-in. loops along its Topock-Milpitas line. It also is building 83 miles of 12, 18, and 20-in. from near Willows, Calif., to Sacramento and plans 200 miles of 12-in. from Sacramento Valley fields to Humboldt County.

Transcontinental Gas Pipe Line Corp. will lay 350 miles of up to 36-in. along its existing system.

Canada . . . Trans-Canada, dogged by all manner of troubles from its inception, should really get rolling during 1957. Prevented by the steel strike from completing the 574 miles of 34-in. from Alberta to Winnipeg last fall, it was able to lay only 220 miles. But the company expects to complete the line to Winnipeg this year. And some work will be done by Trans-Canada, and the crown corporation which will build the northern Ontario bridge, on the 1,263-mile leg from Winnipeg to Toronto.

The other big Canadian project, Westcoast Transmission Co., Ltd., will be finished in November, with 200 miles to go on the 650-mile, 30-in. line from Peace River to Bellingham, Wash.

Westcoast also plans to expand its main line and build a 174-mile, 30-in. line from Savanna Creek field, Alberta, to Kingsgate, B. C.

Crude

Crude-line construction slumped last year, and but for activity in Canada, would have been considerably lower. An upturn is coming this year, however, particularly in the United States. A strong stimulus is the increased demand for U.S. oil to supply markets normally served by the Middle East.

Several big lines have been announced. But the starting date of some is a question mark because pipe mills are booked up through 1959. Swapping of mill schedules among companies is helping to solve this problem.

Texas-New Mexico Pipe Line Co. will build a 515-mile, 16-in. line from the Four Corners producing area to Jal, N. M., where it will connect with pipelines serving the Southwest, Mid-Continent, and Gulf Coast.

Tecumseh Pipe Line Co., a joint venture of Sinclair, Ashland, and Pure, plans a 190-mile, 20-in. line from Griffith, Ind., to Cygnet, Ohio. Union Oil Co. of California is building 225 miles of 12 and 16-in. from the San Joaquin Valley to its Oleum refinery.

Pasotex Pipe Line Co. is adding 127 miles of 20-in. to complete its 195-mile line between Wink and El Paso, Tex. Sinclair Pipe Line Co. may complete the last half of its 300-mile Jacksboro-Houston project this year instead of 1958, as originally planned. The line will be 20-in.

In Canada, Interprovincial Pipe Line Co. is extending its Edmonton-Sarnia system 151 miles to Port Credit, near Toronto, with a 20-in. project. The 1957 program also includes 32 miles of 26-in. loop between Regina, Sask., and Cromer, Man., and 80 miles of loops on the U. S. part of the system—Lakehead Pipe Line Co.

Outstanding projects planned beyond 1957 are Cape Pipe Line Co.'s 500,000-bbl. line from the lower Delaware Bay to the Philadelphia refining area and Industry Pipe Line, which will be a 20 or 30-in. carrier from Midland to Beaumont, Tex.

Products

Another big year in products lines is assured, although some announced projects may not materialize.

Northwest Pipeline Corp. plans 80 miles of 8-in. and 300 miles of 10-in. products and crude line from Four Corners to Salt Lake City. The company has set a spring starting date, but this may be affected by competition of other lines for Four Corners crude.

Ohio Oil Co. will build a 350-mile, 12-in. line from Wood River, Ill., to Chicago. Southern Pacific Pipe Lines, Inc., has started its 300-mile, 6, 8, and 10-in. system from Richmond, Calif., to Fallon, Nev. Great Lakes Pipe Line Co. has announced an 84-mile, 8-in. extension from near St. Paul to Eau Claire, Wis., and 68 miles of 12-in. eastward along its present line into Chicago. Great Lakes is expected to unveil other projects soon.

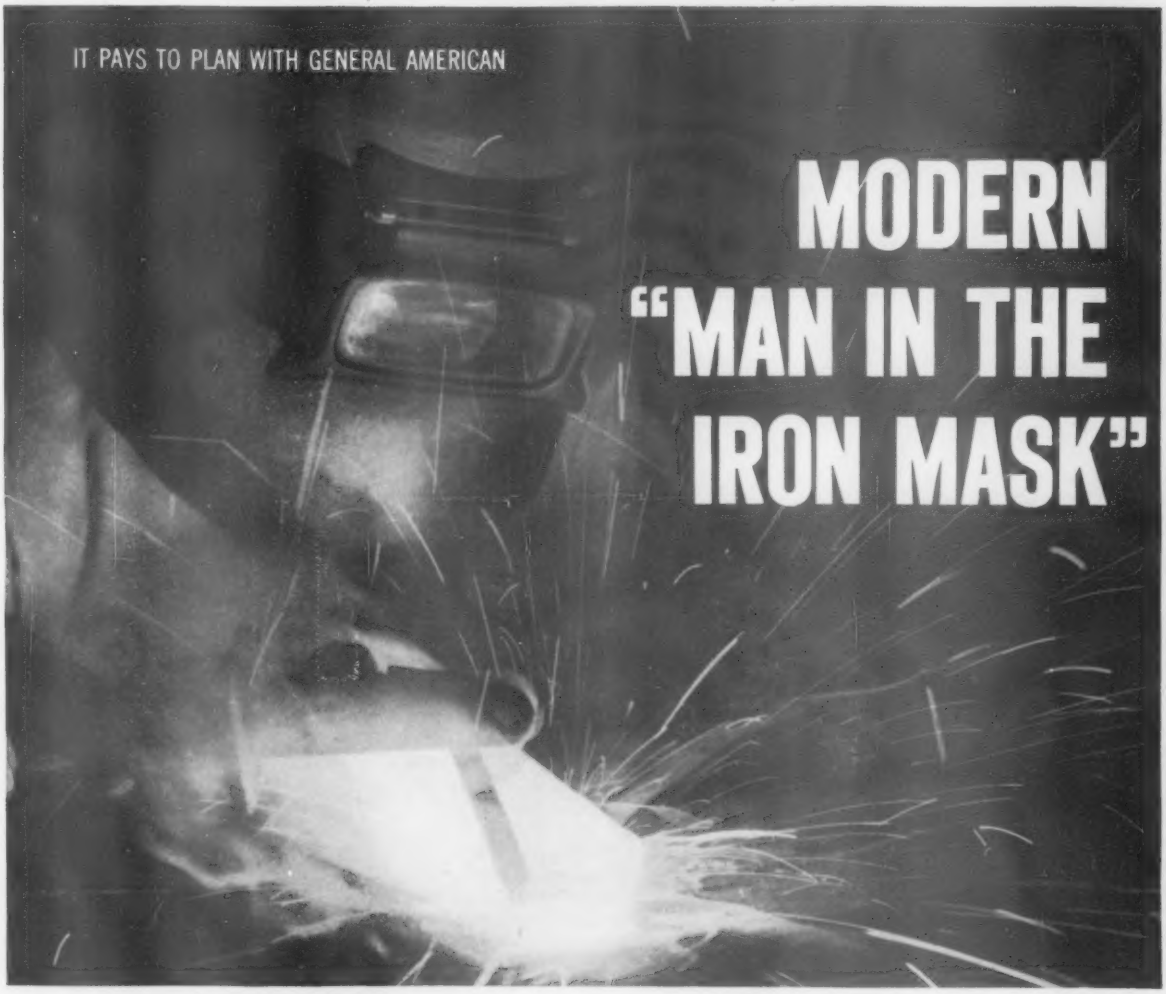
The biggest project proposed in Canada is an L.P.G.-natural gasoline line to run 800 miles from near Edmonton, Alta., to Fort William, Ont. Hydrocarbons Pipeline Co. has announced it will build part of the line this year.

The major event in products pipelining is in the hands of the FPC. It is the conversion of the Little Inch, which will have a profound impact on products transportation from the Gulf Coast and inland.

Foreign

The center of activity has shifted from Europe to Venezuela, where three major projects are under way. They are the Sinclair-Socony 211-mile, 20-in. crude line from Silvestre field in Barinas to Puerto Cabello; Shell de Venezuela's 177-mile, 20-in. gas line from La Paz field to the Cardon refinery; and the 200-mile, 26-in. government gas line from Anaco to Caracas.

Russia is continuing construction of a 900-mile, 26-in. gas line to Moscow and a 2,300-mile crude and products system. Other projects are under way or planned in Bolivia, France, Germany, the Middle East, Spain, Turkey, Colombia, Argentina, Mexico, and Pakistan.



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Refiners get set for fabulous future

Here're their expansion blueprints, as reported to the Journal

American Oil Co. will complete its new refinery at Yorktown, Va., early 1957. A 9,600-bbl. per day delayed coker will be completed this month, and a 7,600-bbl. daily Ultraformer will be completed March 1957.

Company will complete in mid-1957 a 6,200-bbl. per day Ultraformer at El Dorado, Ark.

American Petrofina, Inc., is expanding its plant at Wichita Falls, Tex., (formerly Panhandle Oil's plant). Facilities will include an increase of 1,000 bbl. per day crude capacity, 500 bbl. per day fluid catalytic cracking capacity, and 150 bbl. per day catalytic polymerization. A 1,600 bbl. per day Platformer will also be added.

Anderson-Prichard Oil Corp. is adding 6,500 bbl. per day atmospheric distillation capacity at its Arkansas City, Kans., plant, and increasing asphalt production from 1,000 to 1,250 bbl. per day. Facilities are to be completed by June 1, 1957. A 3,000-bbl. per day propane deasphalting unit will be completed late 1957.

Company is also expanding its Cyril, Okla., plant crude capacity from 11,500 bbl. to 13,500 bbl. per day, adding fluid catalytic cracking capacity of 11,000 bbl. per day with 45 per cent recycle, and adding 600 bbl. per day catalytic polymerization. Completion is set for April 1, 1957.

Atlantic Refining Co. is adding a 15,000-bbl. per day catformer and a 15,000-bbl. per day Unifining unit at Philadelphia. Completion July 1957.

The company is adding the same to its Port Arthur, Tex., refinery.

Aurora Gasoline Co. is adding to its Muskegon, Mich., refinery fluid catalytic cracking capacity of 7,000 bbl. per day, and a polymerization unit of 900-bbl. per day capacity. Both are to be completed February 1957.

Bankline Oil Co. is expanding its plant at Bakersfield, Calif., with a Sinclair-Baker unit, capacity 4,000 bbl. per day, and a fixed-bed Hydroforming unit, capacity 4,000 bbl. per day. Both are to be completed September 1957.

Bay Petroleum Corp. at Denver is adding a Platforming unit, 3,500 bbl. per day, to complete this year.

California Oil Co. will add 10,600 bbl. per day to its crude capacity at the Perth Amboy, N. J., plant. Completion is scheduled for April 1, 1958.

Calumet Refining Co., Princeton, La., is increasing its vacuum distillation capacity 2,200 bbl. per day, and its asphalt capacity 350 bbl. per day, to be completed by June 1, 1957.

Chemoil Corp. is building a new refinery between New Orleans and Baton Rouge. It will have a crude capacity of 22,000 bbl. per day, a capacity for charging topped crude of 10,000 bbl. per day, gas-oil cracking capacity of 14,000 bbl. per day, Houdriflow capacity of 5,000 bbl. per day, and Cycloversion capacity of 9,000 bbl. per day. The plant will also include facilities for 3,000 bbl. per day hydrofluoric alkylation production, 1,000 bbl. per day catalytic polymerization capacity, and 350 tons per day of coke. Refinery will be completed by December 1958.

Cities Service Oil Co. is expanding its Ponca City, Okla., plant crude capacity from 23,500 to 35,000 bbl. per day, facilities for charging topped crude from 7,000 to 10,500 bbl. per day, and is increasing its fluid catalytic cracking capacity 500 bbl. per day, to be completed May 1, 1957. A 6,500-bbl. per day Rexformer will be completed February 1, 1957.

Continental Oil Co. is building a 3,500-bbl. per day reformer at Denver, to be completed January 1, 1958.

Delhi-Taylor Oil Corp. will add to its Corpus Christi refinery a 15,000-bbl. per day Unifining unit, a 4,500-bbl. per day Udex unit, and will increase its Platforming capacity by 10,500 bbl. per day, to be completed June 1957.

Douglas Oil Co. plans a 1,500-bbl. per day Unifining unit at Bakersfield, Calif., to be completed June 1957. Will increase crude capacity by 12,000 bbl. per day by December 1957.

D-X Sunray Oil Co. is adding a 6,000-bbl. per day Unifining unit at its Duncan, Okla., plant in 1958.

The company is adding a 20,000-bbl. per day Unifining unit at its West Tulsa plant, increasing its Platforming capacity by 12,000 bbl. per day, adding hydrofluoric alkylation capacity of 3,000 bbl. per day, and adding isomerization capacity of 2,000 bbl. per day, to be completed in 1958.

El Paso Natural Gas Products Co. is building a new 9,000-bbl. per day plant at Gallup, N. M. Facilities will include a crude-distillation unit, a vacuum unit, fluid catalytic cracking, a Platformer, and hydrofluoric alkylation unit. Completion set for fall 1957.

Esso Standard Oil Co. is building a Powerforming unit with 7,200 bbl. per day capacity at Everett, Mass., to be completed mid-1957.

Farmers Union Central Exchange, Inc. plans a 4,400-bbl. per day Platforming unit and a 12,200-bbl. per day unit at its Laurel, Mont., plant, to be completed March 1958.

General Petroleum Corp. plans to complete in September 1957 a 9,000-bbl. per day Sovaformer at its Ferndale, Wash., plant.

Company will build a 12,000-bbl. per day Sovaformer at Torrance, Calif., to be completed October 1957.

Golden Bear Oil Co. plans to increase its Bakersfield, Calif., plant's crude capacity from 3,500 to 4,500 bbl. per day by March 1957. Company also plans to add within the next year a 500-bbl. per day hydrogen-treating unit and a 500-bbl. per day furfural-extraction unit.

Gulf Oil Corp. will build a 46,800-bbl. per day Platformer and add 3,000 bbl. per day sulfuric alkylation capacity at its Philadelphia plant during 1957. Company also plans a Platformer of 23,400 bbl. per day capacity and an additional 60 tons per day sulfur production at its Port Arthur, Tex., refinery during this year.

Gulf is also considering building a refinery at Charleston, S. C.

Humble Oil & Refining Co. will complete by December 1957 a catalytic cracker at its Baytown, Tex., refinery.

Kendall Refining Co. is adding a 2,000-bbl. per day Unifining unit at its Bradford, Pa., plant, to be completed the second quarter of 1957.

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Co.) is building a 10,000-bbl. per day delayed coker at Continental's Lake Charles, La., refinery, to be completed September 1957.

Louisville Refining Co., Louisville, Ky., is doubling its Platforming capacity to 4,000 bbl. per day, and adding a Unifining unit of 2,000 bbl. per day, to be completed March 1, 1957.

Magnolia Petroleum Co. will complete a 100,000-bbl. per day crude distillation unit, facilities for charging 32,000 bbl. per day topped crude, a 30,000-bbl. per day Sovafining unit, and add 8,000-bbl. per day to its sulfuric alkylation production by March 1958, at Beaumont, Tex.

Malco Refineries, Inc., is adding hydrofluoric alkylation production at its Artesia, N. M., plant. Capacity will be 900 bbl. per day, and completion is scheduled for March 1, 1957.

North American Petroleum Corp. plans a refinery at Corpus Christi.

Phillips Petroleum Co. will replace its 1,200 bbl. per day thermal cracking facilities at its Great Falls, Mont., plant with a catalytic cracking unit, by mid-1957.

Pontiac Eastern Refining Co. is building a new refinery at Hattiesburg, Miss., to be completed April 1957. Facilities will include an 11,000-bbl. per day crude unit, a 2,750-bbl. per day fractionation unit for purchased distillates, a 4,800-bbl. per day fluid coking unit, a 25,700-bbl. per day T.C.C. catalytic cracking unit with 63 per cent recycle, a 2,500-bbl. per day sulfuric alkylation unit, a 20-ton per day sulfur-recovery unit, and coke capacity of 225 tons per day.

Premier Oil Refining Co. is building a 2,000-bbl. per day Platformer and a 1,500-bbl. per day Unifiner at its Longview, Tex., plant, to complete 1957.

Pure Oil Co. is building a 12,000-bbl. per day catalytic reformer and a 17,000-bbl. per day feed-preparation unit at Lemont, Ill., to be completed mid-1957.

Rock Island Refining Corp. at Indianapolis is expanding its Platforming capacity from 2,400 to 2,800 bbl. per dya, and its Unifining capacity from 400 to 4,600 bbl. per day. Expansion is to be completed August 1, 1957.

Salt Lake City Refining Co. will expand its Salt Lake City plant's crude capacity by 3,000 bbl. per day, and facilities for charging topped crude by 2,000 bbl. per day, both to be completed by June 1957. A 6,000-bbl. per day Platforming unit will also be added by November 1957.

Shell Oil Co. is building a 1,500-bbl. per day asphalt plant at Martinez, Calif., to be completed March 1957.

Company is adding a 16,000-bbl. per day Platformer and a catalytic hydrodesulfurizing unit at its Wilmington-Dominguez refinery in California.

A Platformer and Unifiner will be built at Los Angeles.

Sinclair Refining Co. will build a 7,500-bbl. per day catalytic reforming unit at Hartford, Ill., by July 1957.

A 5,000-bbl. per day Hydrofinisher at its East Chicago plant will be completed April 1957.

Sioux Oil Co. will increase its crude capacity by 500 bbl. per day at its Newcastle, Wyo., plant by July 1, 1957.

Skelly Oil Co. is planning a hydrofluoric alkylation unit with 3,500 bbl. daily capacity at El Dorado, Kans., to be completed spring 1958.

Socony Mobil Oil Co., Inc., will complete early this year a 12,000-bbl. per day Sovaformer and a 16,000-bbl. per day Sovafiner at East St. Louis, Ill.

The company will also complete in March 1957 a 22,000 hydrodesulfurization unit at Paulsboro, N. J.

A 2,435-bbl. per day sulfuric alkylation unit will be built at Buffalo, N. Y.

A 3,500-bbl. per day sulfuric alkylation unit will be built at Trenton, Mich.

A 9,000-bbl. per day catalytic reformer will be built at Augusta, Kans.

A 3,000-bbl. per day reformer and a 3,250-bbl. per day catalytic hydrodesulfurizer will be built at Casper, Wyo., to be completed in fall of 1957.

Sohio Oil Co. will add new facilities at its Toledo refinery to replace part of present facilities. Capacity will be 60,000 bbl. per day, an increase of 32,000 over present capacity. Facilities will include atmospheric and vacuum crude distillation, delayed coking, catalytic cracking, catalytic polymerization, catalytic reforming, and hydrogenation units, to be completed April 1958.

Southland Oil Co. will build a 15,000-bbl. per day refinery at Tampa, Fla. Company is expanding its Memphis plant (formerly Delta Refining Co.'s plant). Crude capacity will be 22,000 bbl. per day by October 1957.

Standard Oil Co. of California is building a 25,000-bbl. per day refinery at Honolulu. Completion, late 1957.

Company will build a new refinery near Everett, Wash., with a capacity in the range of 60,000 to 100,000 bbl. per day. Construction may start late 1957.

A 25,200-bbl. per day residuum stripper will be built at El Segundo, to be completed April 1957.

Standard Oil Co. (Ind.) plans a 21,000-bbl. per day Ultraformer at its Whiting, Ind., plant by April 1958.

Company will build a 6,000-bbl. per day Ultraforming unit at Neodesha, Kans., to be completed early 1958.

The company is also building a 3,800-bbl. per day alkylation unit at Sugar Creek, Mo., to be completed early 1957.

A heavy-oil modernization program is being carried out at Standard's Casper, Wyo., plant. It includes a 4,800-bbl. per day vacuum unit, 1,000-bbl. per day propane deasphalting, 1,500-bbl. per day furfural extraction, and 2,000-bbl. per day MEK dewaxing and deoiling unit. Completion, mid-1957.

Standard Oil Co. (Ohio) will add 3,750 bbl. per day sulfuric acid alkylation at Cleveland by May 1958.

Standard Oil Co. of Texas plans to expand facilities at its El Paso plant. It will increase crude capacity by 25,000 bbl. per day, facilities for charging topped crude by 13,200 bbl. per day. A 13,500-bbl. per day fluid catalytic cracking unit will be added and recycle of total feed will be 100 per cent. A catalytic polymerization unit will be added, capacity 2,025 bbl. per day. Completion set for February 1, 1958.

Sunset International Petroleum Corp. (formerly Sunset Oil Co.) is increasing its catalytic cracking capacity at Long Beach, Calif., by 800 bbl. per day with a Thermofor unit to be completed March 1, 1957. The company will also increase its catalytic polymerization 100 bbl. per day by March 1, 1957.

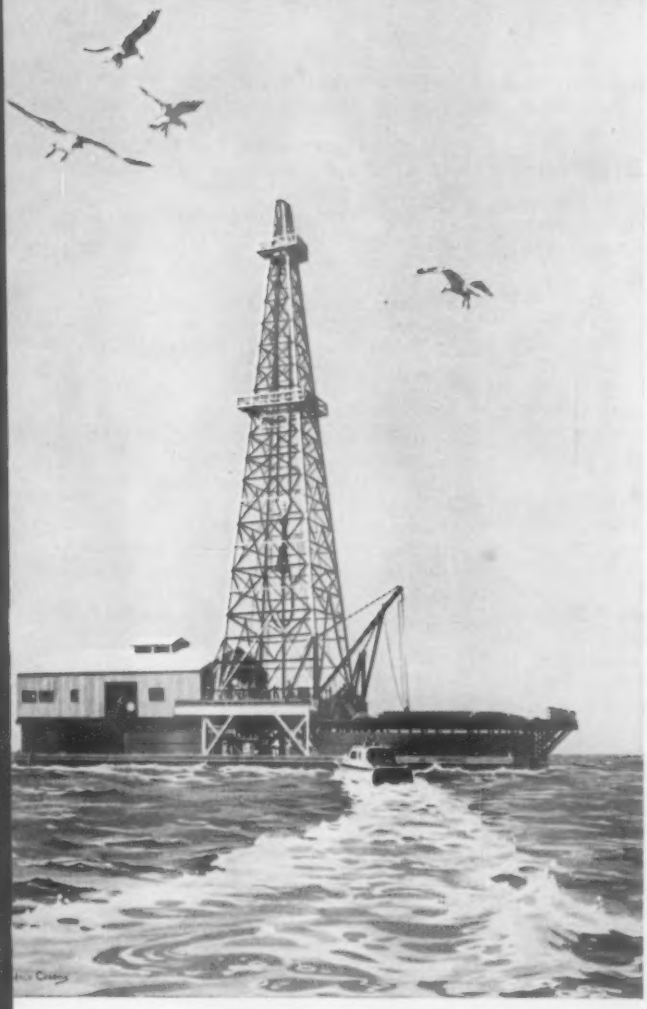
Suntide Refining Co. will add to its Corpus Christi plant a 15,000-bbl. per day Rexforming unit, and a 7,500-bbl. per day Unifining unit, both to be completed June 1957. It will also increase facilities for charging topped crude by 8,500 bbl. per day by September 1957.

Texas City Refining, Inc., plans to expand its Texas City, Tex., plant's Houdriflow capacity by 1,000 bbl. per day. It will also add 7,000-bbl. per day Houdriflow and 7,000-bbl. per day Houdry facilities. Work to be completed 1957.

The Texas Co. is completing this month a 13,500-bbl. per day visbreaker at Eagle Point, N. J.

Company is considering building a refinery at Anacortes, Wash.

An 80,000-bbl. per day vacuum still is being built to replace the present 60,000-bbl. per day one at Port Arthur,



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Tex., to be completed December 1957. Also, a fluid catalytic cracker of 90,000 bbl. per day will be built.

Tidewater Oil Co. is building a 22,500-bbl. per day Houdriforming unit at its Avon, Calif. Completion 1958.

Union Oil Co. of California plans a 14,500-bbl. per day Platformer and a 15,750-bbl. per day Unifining unit at its Los Angeles refinery.

United Refining Co. is building a fluid catalytic cracking unit with 4,000-bbl. per day capacity, and a catalytic polymerization unit with 225-bbl. per day capacity at Warren, Pa. Both will be completed March 1957.

Vickers Petroleum Co., Inc. at Potwin, Kans., is adding an Ultraforming unit, capacity 3,500 bbl. per day, to be completed May 1957.

Wilshire Oil Co. of California will complete a 10,000-bbl. per day Unifiner-Platformer late 1957, at Norwalk, Calif.

PUERTO RICO

Commonwealth Oil Refining Co. at Guayanilla, Puerto Rico, will increase its crude capacity 35,280 bbl. per day, facilities for charging topped crude 20,700 bbl. per day, Houdry capacity 26,800 bbl. per day with 50 per cent recycle, Houdriforming capacity 3,730 bbl. per day, and catalytic polymerization capacity 1,470 bbl. per day, to be completed by September 1957.

. . . and in Canada

British American Oil Co., Ltd., plans to complete by early 1957 a 15,500-bbl. per day Hydrodesulfurization unit at its Montreal, Que., plant.

At its Clarkson, Ont., plant, crude capacity will be increased 40,000 bbl. per day, facilities for charging topped crude will be increased 22,200 bbl. per day in late 1957. A 10,000-bbl. per day Catforming unit and 12,000-bbl. per day Hydrodesulfurization unit will be completed early 1957.

Canadian Oil Companies, Ltd., plans to add a 4,400-bbl. per day Platformer and a 3,650-bbl. per day Udex unit at Corunna, Ont., August 1957.

Consumers Cooperative Refineries, Ltd., plans to complete in 1957-58 at Regina, Sask., a crude-distillation unit with 16,000-bbl. per day capacity, and to add 1,000-bbl. per day capacity to its thermal cracking unit.

Imperial Oil, Ltd., will complete this year a detergent alkylate plant with 30,000,000 lb. per year capacity at its Sarnia, Ont., plant.

Company also plans to complete this year a Powerforming unit of 9,000 bbl. per day at Montreal East, Que.

A Powerformer and a Hydrofiner will be added to the Winnipeg refinery. Plans are to boost crude capacity from 15,000 to 17,500 by early 1958.

McColl-Frontenac Oil Co., Ltd., will add a 3,000-bbl. per day Platformer at Edmonton, Alta., April 1957.

A 10,000-bbl. per day Hydrotreating unit will be added to the Montreal East, Que., plant late 1957.

Pacific Petroleums, Ltd., plans a 500-bbl. per day Houdriformer at its Dawson Creek, B. C., plant (formerly X-L Refineries' plant).

Regent Refining (Canada), Ltd., is expanding its crude capacity by 6,000 bbl. per day at its Port Credit, Ont., refinery. Other expansion under way is 3,000-bbl. per day additional visbreaker capacity, a 10,000-bbl. per day new vacuum unit, a 7,000-bbl. per day new fluid catalytic cracker, and a 730-bbl. per day new catalytic polymerization unit. Completion, spring 1957.

Royalite Oil Co., Ltd., plans to add a 1,000-bbl. per day Platformer and a 1,500-bbl. Unifining unit to its Kamloops, B. C., plant by September 1957.

Royalite Hi-Way, Ltd., at Saskatoon, Sask., will increase its crude capacity 450 bbl. per day by August 1957.

Shell Oil Co. of Canada, Ltd., is building a 1,500-bbl. per day alkylation unit at the Montreal East, Que., refinery. Completion is set for 1958. Sometime in 1957, facilities for 600 tons per day of straightrun asphalt will be built.

. . . Field processing plants reveal expansion plans

Atlantic Refining Co. is planning an absorption plant for recovery of propane, butane, and natural gasoline. The plant, to be completed in 1957, will be near Crane, Tex.

Cities Service Oil Co., Delta Engineering Co. has contract to build a plant on the Roberts ranch of Midland County, Texas. Cities Service will be operator with lease holders joining in construction. Initial capacity will be 25 M.M.c.f.d. with ultimate capacity 50 M.M.c.f.d.

El Paso Natural Gas Co., Stearns-Roger of Denver, is expanding existing facilities for El Paso Natural at two of its plants in New Mexico. The plants are at Blanco field, San Juan County, near Bloomfield, and at Wingate field, McKinley County, near Gallup. Work is expected to be completed in 1957.

General Petroleum Corp. is expanding facilities at its Santa Fe Springs plant. Three additional compressors and an increase in absorption and cooling capacity are being built at a cost of $100,000.

Ginther, Warren & Ginther will build a plant just south of Fort Morgan, Colo.

Kentucky West Virginia Gas Co. is planning a new plant, to be completed in 1957, in Floyd County, near Maytown, Ky.

Magnolia Petroleum Co. will complete this month a new natural-gasoline plant in Spivey Grabs field of Harper and Kingman counties, Kansas. It will process 40 M.M.c.f.d. of gas and produce 21,000 gal. of natural gasoline and 26,000 gal. of butane and propane per day.

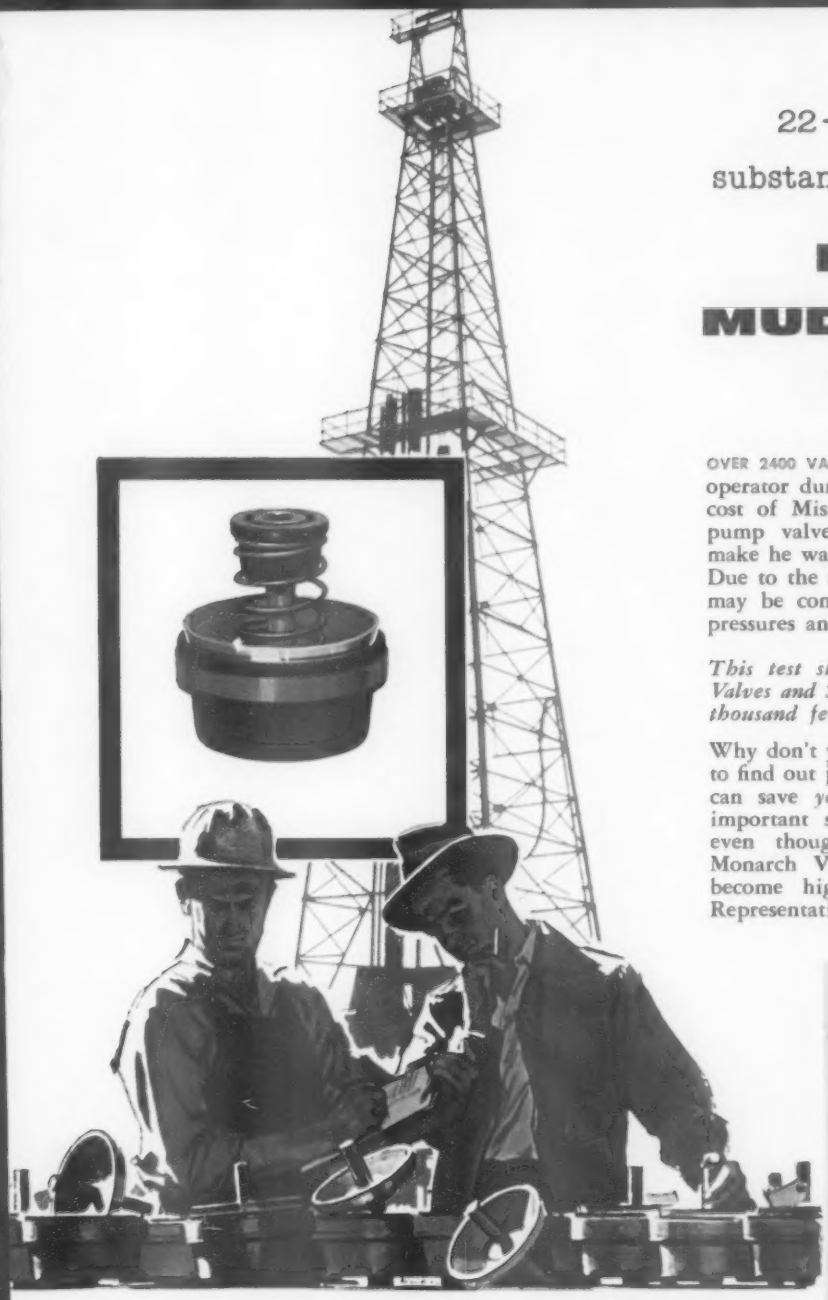
New Drilling Co. is building a 6 M.M.c.f.d. plant at Roggen, Colo.

Pacific Petroleums, Ltd. and **Phillips Petroleum Co.** are building a 3,000-bbl. natural-gasoline plant at Taylor Flats, B. C., Canada. It will include fractionating towers, a catalytic desulfurizer and reforming unit, a dehydrogenation unit, an isomerization unit, an alkylation unit, and blending, storage, and loading facilities. Construction will be completed sometime in 1957.

Russell Engineering Corp. of Houston, will build and operate a 2.5 M.M.c.f.d. plant in Vallery field east of Fort Morgan, Colo.

Sunray Mid-Continent Oil Co. is building a 17,500 M.c.f.d. field processing plant near Carney in Lincoln County, Oklahoma. Operations are expected to start April 1, 1957.

Texas Gas Exploration Corp. and **Union Oil & Gas Corp. of Louisiana** will build an absorption-type plant 6 miles west of Eunice, La., in Acadia Parish, near North Tepetate field. The plant, to be operated by Union Oil & Gas Corp. of Louisiana, will have a capacity of 300 M.M.c.f.d. Products will include propane, isobutane, normal butane, and natural gasoline. Completion is scheduled for mid-1957.



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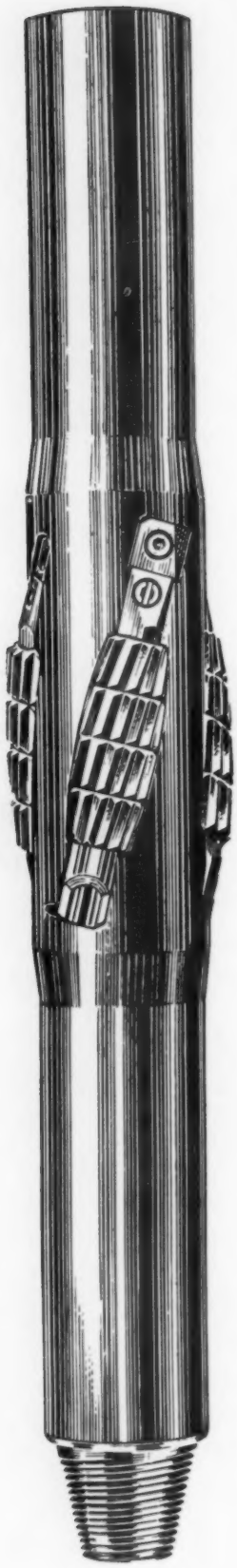

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Petrochemicals: Big round of expansion in ethylene and derivatives

American Cyanamid Co., Avondale, La., is doubling capacity for acetylene, hydrocyanic acid and acrylonitrile, completion mid-1958. Also planning facilities for new acrylonitrile derivatives. (1956-58 expansions total $30,000,000) Planning acrylic fiber facilities at North Florida location for completion mid-1958.

American Synthetic Rubber Corp., Louisville, Ky., is expanding synthetic rubber (GR-S) capacity to 68,500 long tons per year. Completion first quarter 1957 at cost of $3,000,000.

Amoco Chemicals Corp. (affiliate Standard Oil Co. of Indiana) is building polybutene facilities of 250 bbl. per stream day capacity at cost of $1,050,000 for completion in early 1957 at Destrehan, La. (formerly Pan-Am Southern Corp.). Also to build 60,000,000-lb. per year plant to include manufacture of phthalic anhydride, isophthalic acid, terephthalic acid, dimethyl terephthalate, dimethyl isophthalate and benzoic acid at a cost of "over $10,000,000" using new Scientific Design Co. direct oxidation process, with likely location at Whiting, Ind. Construction to begin in early 1957, completion in 1958.

Ammonia Chemical Corp. of California, Huron, Calif. together with Monterey Oil Co. is to build $5,000,000 anhydrous ammonia plant to use 5 M.M.s.c.f.d. natural gas as feed. completion early 1958.

Ashland Oil & Refining Co. (Frontier Refining Div.) Buffalo, is building 21,000,000-gal. per year aromatic plant (benzene, toluene, xylenes), completion late 1957; 7,500-bbl. per day cat reformer to make aromatics.

Brea Chemical Co. and Koppers Co., Wilmington, Calif.: Polyethylene, 60,000,000 lb. per year at cost of $20,000,000, low-pressure process. To use ethylene from Union Oil Co. ethylene plant now building. Koppers to build units and Brea to operate. Completion late 1957.

Canadian Gulf Oil Corp., Alta., is building sulfur-recovery plant in Pincher Creek gas fie'd.

Canadian Hydrocarbons, Ltd., Winnipeg, Man., is considering $25,000,000 plant for 80-ton per day ammonia and 600-ton per day high-analysis nitrogen fertilizers.

Canadian Industries, Ltd., Millhaven, Ont., is building 200-ton per day ammonia plant. Also considering expansion of polyethylene at Edmonton, Alta.

Canadian Oil Refineries, Ltd., Sarnia, Ont.: Aromatics facilities (benzene, toluene, and xylenes) for completion last quarter 1957. Cost $3,000,000—a 4,400-bbl. per day Platformer and 3,650-bbl.-daily Udex unit.

Carbide Chemicals Co., Div. of Union Carbide Canada, Ltd., Montreal East, Que., is expanding ethylene glycol and polyethylene facilities.

Carbide & Carbon Chemicals Co. is building two low-pressure polyethylene plants, one at Institute, W. Va., and one at Seadrift, Tex., with combined capacity of 55,000,000 lb. per year. Completion at Institute in first quarter of 1957 and at Seadrift in mid-1957. Also likely building ethylene plant at Institute since 4-in. and 5-in. products line has been built to operate in spring 1957 carrying "ethane concentrates" from Equitable Gas Co. plant at Maytown, Ky. Ethanolamines unit at Seadrift is on stream bringing Carbide's capacity to an estimated 90,000,000 lb. per year. Also at Seadrift adding 65,000,000 lb. per year ethylene glycol and boosting ethylene oxide to 200,000,000 lb. per year. Plant at Torrance, Calif. on stream—polyethylene (60,000,000 lb. per year) and ethylene oxide-glycol, plant cost $36,000,000.

Celanese Corp. of America is building 40,000,000-lb. per year polyethylene plant near Pasadena, Tex., using Phillips low pressure license and ethylene from Phillips Sweeny, Tex., plant, completion 1957. Expanding Bishop, Tex., plant by 25 per cent in methanol, formaldehyde, and acetaldehyde, completion 1957. At Pampa, Tex., starting 15,000,000-lb. per year acrylic acid esters unit for completion in last quarter 1957.

Commercial Solvents Corp and Columbia Gas Systems, Inc., are making engineering studies of 40 to 50-million-dollar "ethylene and other hydrocarbon derivatives" project to be located in Ohio Valley, construction to start in early 1957.

Commercial Solvents Corp., Sterlington, La., is expanding methanol and other petrochemical derivatives at cost of $10,000,000. Methanol expansion completion in mid-1957.

Cornwall Chemicals, Ltd., Cornwall, Ont. (Canadian Industries, Ltd., and Stauffer Chemical Co.). Building carbon tetrachloride plant for completion in second quarter 1957 at cost of over $1,000,000. Has expanded carbon disulfide capacity to make this available as feed for tetrachloride manufacture.

Cosden Petroleum Corp., Big Spring, Tex., is completing $3,000,000 plant including ultrafractionation facilities to separate ethylbenzene from mixed xylenes and dehydrogenation of ethylbenzene to make 20,000,000 lb. per year styrene. Existing 4,500-bbl. per day Platformer-Udex on 100 per cent aromatics (benzene, toluene, xylenes) operation.

Delhi-Taylor Oil Corp., Corpus Christi, Tex., is building a 12,000-bbl. per day Platformer and 4,500-bbl. daily Udex unit for benzene, toluene, xylenes (total aromatics capacity 30,000,000 gal. per year) at cost of $6,000,000. Completion July 1957.

Diamond Alkali Co., Pasadena, Tex., is expanding perchlorethylene to nearly double present capacity, completion early 1957. Planning acetylene-from-natural-gas plant of 40-tons-daily capacity at cost of $10,000,000.

Dow Chemical Co.: At Plaquemine, La., is building an integrated plant to include ethylene oxide-glycol manufacture, propylene oxide-glycol, carbon tetrachloride, ethylene dichloride, trichlorethylene, vinyl chloride at cost of about $50,000,000. At Freeport, Tex., is expanding ethylene oxide and glycol and triethylene glycol and will be making ethanolamines; is planning acetylene and derivatives at Freeport for later. Present glycerin capacity of 36,000,000

lb. per year at Velasco, Tex., is to be expanded. Styrene - butadiene latexes facilities at Pittsburg, Calif., have been completed. Dow also plans manufacture of a new synthetic fiber at Lee Hall, Va., for spring of 1958 at cost of $15,000,000.

Dow Chemical of Canada, Ltd., Sarnia, Ont., is expanding ethylene 100 per cent and building ethanolamines facilities (cost $4,000,000). Building pentachlorphenol unit and planning polyethylene unit.

E. I. du Pont de Nemours Co., is increasing existing high-pressure polyethylene at Orange, Tex., and considering increase in methanol at Orange by 30,000,000 gal. per year. (Also has resumed methanol production at Belle, W. Va.). Converting from coal to natural-gas feed for ammonia synthesis at Belle, W. Va., and doubling methyl methacrylate capacity at this location, for completion in mid-1958. At Antioch, Calif., planning addition to TEL and fluorinate hydrocarbons plant to consist of ethyl chloride, trichlorethylene, and perchlorethylene; completion 1957. At Beaumont, Tex., new chlorosulfonated polyethylene synthetic rubber facilities to be completed first quarter 1957. Building 40,000,000-lb. per year acrylic fiber orlon plant at Waynesboro, Va. Expanding Mylar polyester film capacity by 50 per cent at Circleville, Ohio.

Esso Standard Oil Co., at Baton Rouge, is building $12,000,000 ethylene-recovery unit—part of $40,000,000 refinery expansion. Announced at end of 1955 construction of plant at Linden, N. J., to include ethylene recovery and manufacture by pyrolysis. Capacity or completion date not given. So far has contracted for 70,000,000 lb. per year of ethylene to Hercules and General Aniline & Film Corp.

Ethyl Corp., Pittsburg, Calif.: TEL plant to be built adjacent to Dow Chemical Co. plant. Construction to start in spring of 1957.

Firestone Tire & Rubber Co., Orange, Tex., is building 40,000-ton per year butadiene plant. Completion 1957. Also expanding synthetic-rubber facilities from 100,000 to 150,000 long tons per year at Lake Charles, La., and from 30,000 to 40,000 long tons yearly at Akron.

General Aniline & Film Co., Linden, N. J.,: Ethylene oxide 60,000,000 lb. per year, direct-oxidation process; ethylene glycol 35,000,000 lb. per year. Ethylene from Esso. Plant cost $8,000,000.

General Tire & Rubber Co., Odessa, Tex., is building GR-S copoly plant rated capacity 40,000 long tons per year. Completion mid-1957.

Gonzales Chemical Industries, Inc., Guanica, Puerto Rico, is completing ammonia plant for 42,000 long tons per year of anhydrous ammonia; 125,000 tons per year of ammonium sulfate. Capital investment $13,000,000. Will use partial oxidation of liquid feed.

Goodrich-Gulf Chemical, Inc.: At Port Neches, Tex., present GR-S synthetic-rubber capacity of 90,000 long tons per year to be expanded stepwise as butadiene at adjoining Neches Butane Products Co. plant is expanded. At Institute, W. Va., it plans 4-year expansion and modernization program of synthetic-rubber facilities at cost of 6 to 8 million dollars.

Goodyear Synthetic Rubber Corp., Houston, is expanding GR-S synthetic rubber from 137,500 to 170,000 long tons per year at cost of $6,000,000. Completion early 1957. Plan ultimate capacity (second stage) of 200,000 long tons per year; 50 per cent expansion over next 5 years.

Grace, W. R., & Co., Baton Rouge, is building 50,000,000-lb. per year polyethylene plant at probable investment of $18,000,000. Ethylene from Esso at Baton Rouge. Using Phillips low-pressure process. A $1,000,000 semiworks plant is in operation. Completion of commercial plant mid-1957.

Gulf Oil Corp., Port Arthur, Tex., had announced at end of 1955 consideration of a third ethylene unit of similar size to No. 2 ethylene plant at Port Arthur, capacity 200,000,000 lb. per year; is expanding sulfur recovery to 120 tons per day, completion 1957.

Hercules Powder Co.: To build at Parlin, N. J., 30,000,000-lb. per year Ziegler low-pressure polyethylene at cost of $10,000,000 using ethylene from Esso. Reported building facilities for formaldehyde, pentaerithrytol, and methanol at cost of $6,000,000 at Louisiana, Mo. Also planning 35,000,000 lb. per year of mono methyl methacrylate and polymer at cost of $11,000,000 for completion in late 1958 at Louisiana, Mo.

Heyden Chemical Co., Fords, N. J., is reported building 25,000,000-lb. per year pentaerithrytol plant.

Humble Oil & Refining Co., Baytown, Tex., is to build 80,000,000 lb. per year ethylene facilities—low-temperature recovery unit. Construction begins May 1957 and completion for mid-1958. (Will have additional gas streams available from new cat cracking facilities). Plans to double capacity later. Reported to be considering ethylene oxide-glycol. Expanding butadiene capacity by 16,000 short tons per year from present 49,000, with completion in first quarter of 1957. Building a benzene plant with capacity of 24,000,000 gal. per year for completion in late 1957.

Imperial Oil Co., Ltd., Sarnia, Ont., is expanding recovery facilities for ethylene, propylenes, butylenes, butadiene, aromatic distillates and tars. Total cost of expansion $25,000,000. Building unit to make dodecylbenzene for detergents at cost of $3,800,000.

Jefferson Chemical Co., Port Neches, Tex.: New $38,000,000 expansion—ethylene capacity to be tripled from present capacity of 90,000,000 lb. per year; ethylene oxide (now 110,000,000 lb. per year) to be boosted by 50 per cent with addition of new direct-oxidation units, existing chlorohydrination units to continue operation; ethylene glycol (now 63,000,000 lb. per year) to be doubled; will make ethylene chloride; will build chlorine facilities with caustic to be marketed and hydrogen used internally; also to build units for propylene oxide-glycol and other propylene derivatives; to expand ethylene oxide specialties and morpholine. (Had previously doubled amines capacity).

Jefferson Lake Sulphur Co. and **Pacific Petroleum, Ltd.,** Taylor Flats, B. C.: Sulfur-recovery plant reported at 412 tons per day at cost of $1,800,000 on Peace River gas. Completion in fall 1957.

Koppers Co., Inc., Kobuta, Pa.: Polyethylene plant reported variously at Kobuta and also as "planning 30,000,000 lb. per year low-pressure polyethylene at Woodridge Township, N. J." (See also Brea-Koppers). Building expandable polystyrene bead plant at Kobuta. Large-scale plant, completion in early 1958.

Kerr-McGee Oil Industries, Inc., Cleveland, Okla.: Building Udex unit at cost of $1,500,000 for completion in late 1957.

Laurentide Chemical & Sulphur Co., Montreal East, Que., is building 33,000-long-ton per year sulfur recovery plant at cost of $1,250,000 using hydrogen sulfide gas streams from area refineries.

Monsanto Chemical Co., Texas City, Tex., is expanding ethylene facilities for

completion in early 1957 by pyrolysis of n-butane with butylenes and butadiene as byproduct streams.

National Petrochemicals Corp., Tuscola, Ill., is expanding ethylene from 350 to 450 tons per day with completion at end of 1957. Expanding existing high-pressure polyethylene to 100,000,000 lb. per year with completion in last quarter of 1957.

Neches Butane Products Co. (Goodrich-Gulf, Texas-U. S. Chemical), Port Neches, Tex.: Butadiene capacity being expanded stepwise from 190,000 to 300,000 short tons per year with the latter figure to be reached in the fall of 1958.

Odessa Butadiene Co. (El Paso Natural Gas Co., Odessa Natural Gas Co., United Carbon Co. and General Tire and Rubber), Odessa, Tex.; Building 50,000-ton per year butadiene plant at cost of $20,000,000 for completion in mid-1957.

Olin-Mathieson Chemical Corp., Brandenburg, Ky.: New amines unit put stream late 1956.

Oronite Chemical Co. asked $1,200,000 Louisiana state tax exemption to expand Oak Point, La., additives plant. Completing benzoic-toluic acid recovery unit at Richmond, Calif., with capacity of "several million pounds per year."

Petroleum Chemicals, Inc., Lake Charles, La., has completed butadiene expansion by 16,000 tons per year to 80,000 tons per year; building an ammonia plant with capacity of 100,000 tons per year of anhydrous ammonia at estimated cost of $12,000,000 for completion in late 1957; building an ethylene plant with capacity of 200,000,000 lb. per year for completion in January 1958—will offer commercially both standard and high-purity ethylene. Reported considering ethylene oxide-glycol facilities.

Petro-Tex Chemical Corp., Houston, is completing expansion of butadiene facilities from 90,000 to 135,000 tons per year. Completion scheduled for early 1957.

Phillips Petroleum Co., Sweeny, Tex., is building 290,000,000-lb. per year ethylene unit to use butane cracking, completion 1957. Also reported building acetylene unit in conjunction with ethylene plant completion last half of 1957. A 74-mile, 4- and 6-in. ethylene line laid between Sweeny and Phillips Chemical Co. Houston Ship Channel plant.

Phillips Chemical Co., is building a low-pressure 120,000,000-lb. per year polyethylene plant on Houston Ship Channel (Pasadena, Tex.) at cost of "over $30,000,000" for completion in 1957. Completing expansion of butadiene at Borger, Tex., from 74,000 to 98,000 tons per year; also at Borger expanding GR-S synthetic rubber from 63,000 to 108,000 long tons per year.

Phillips Pacific Chemical Co., Kennewick, Wash., is building 200-ton per day anhydrous ammonia plant as joint venture of Phillips Petroleum Co. and Northwest Pipeline Corp. with Phillips to operate.

Polymer Corp.: Crown-owned corporation has option on 1,100 acres near Red Deer, Alta., on which to build 5 to 6-million-dollar butadiene plant with feed streams to come from nearby British American Oil Co. refinery; butadiene capacity to be 7,000 tons per year.

Rohm & Haas Co., Pasadena, Tex., has contracted for Texaco Development-H.R.I. partial oxidation of natural gas to synthesis gas. (Reported will spend over $20,000,000 for acetylene and ammonia facilities).

Shell Chemical Corp., Norco, La., is building 40,000,000-lb. per year methyl ethyl ketone for completion early 1957; also at Norco adding hydrogen peroxide facilities for completion in early 1957 and planning 30,000,000 lb. per year glycerin (via acrolein); epoxy manufacture may be added later. At Norco, Houston, and Dominguez plants have two-stage expansion under way to boost isopropyl alcohol by 120,000,000 lb. per year—first stage to 70,000,000 lb. per year completion in 1957 and second stage for completion in 1958. At Torrance, Calif., is expanding GR-S synthetic rubber from 89,000 to 110,000 long tons per year for completion in November 1957—butadiene capacity was increased by 20 per cent, on stream in late 1956.

Shell Oil Co. of Canada, Ltd., Montreal East, Que., has completed facilities for sec-butyl alcohol and methyl ethyl ketone. Building synthetic detergent alkylate (dodecylbenzene) plant, completion mid-1957.

Sinclair Chemicals Inc., Houston, is expanding SO_3 sulfonation and lube-oil synthetic detergents additives plant at cost of $2,200,000.

Southern Nitrogen Co., Inc., Savannah, Ga., is building ammonia plant to make 257 tons per day anhydrous ammonia; also nitrogen solutions, prilled ammonium nitrate, and urea at estimated cost of $14,000,000 for completion in first quarter of 1957.

St. Paul Ammonia Products Co., Pine Bend, Minn., is building $16,000,000 ammonia plant with capacity of 200 tons per day of anhydrous ammonia, ammonium nitrate solutions.

Suntide Refining Co., Corpus Christi, Tex., is building 15,000-bbl. per stream day Rexformer and 7,500 bbl. per stream day Udex unit, for completion in September 1957 for B.T.X. operation with approximate capacity of 6,000,000 gal. per year nitration-grade benzene, 12,000,000 gal. per year nitration-grade toluene, and over 22,000,000 gal. per year 10° xylene.

Texas Butadiene & Chemical Corp., near Houston, is completing Lyondell plant to make maximum 65,000 tons pear year butadiene, also butylenes, motor alkylate and avgas, completion early 1957.

Texas Eastman Co., Longview, Tex., is expanding existing high-pressure polyethylene to 40,000,000 lb. per year. Expanding Oxo facilities to increase butyraldehydes production. Also to build semicommercial linear polyethylene unit using Standard of Indiana's new process.

The Texas Co.: At Lockport, Ill., is building an ammonia plant with capacity of 180 tons per day, estimated completion in late 1957 or early 1958. At Port Arthur, Tex., is constructing lube-oil additives plant for completion early 1957.

Texas-U. S. Chemical Co., Port Neches, Tex.: Synthetic rubber (GR-S) capacity to be expanded stepwise as butadiene capacity at adjoining Neches Butane Products Co. plant is expanded. (Expansion by nearly 35 per cent to about 134,000 long tons per year has been completed).

Union Oil Co., Wilmington, Calif., is building 100,000,000-lb. per year ethylene plant for completion in early 1958. Most of ethylene to Brea-Koppers polyethylene plant.

Visco Products Co., Anaheim, Calif., is building plant for crude-oil desalting and dehydrating chemicals.

Wyandotte Chemicals Corp., Geismar, La., is building ethylene oxide-glycol plant at cost of $8,000,000 with capacity of 60,000,000 lb. per year of ethylene oxide, completion in late 1957. Ethylene from Esso at Baton Rouge. Also to build a $20,000,000 electrolytic chlorine-caustic plant for completion in last half of 1958.

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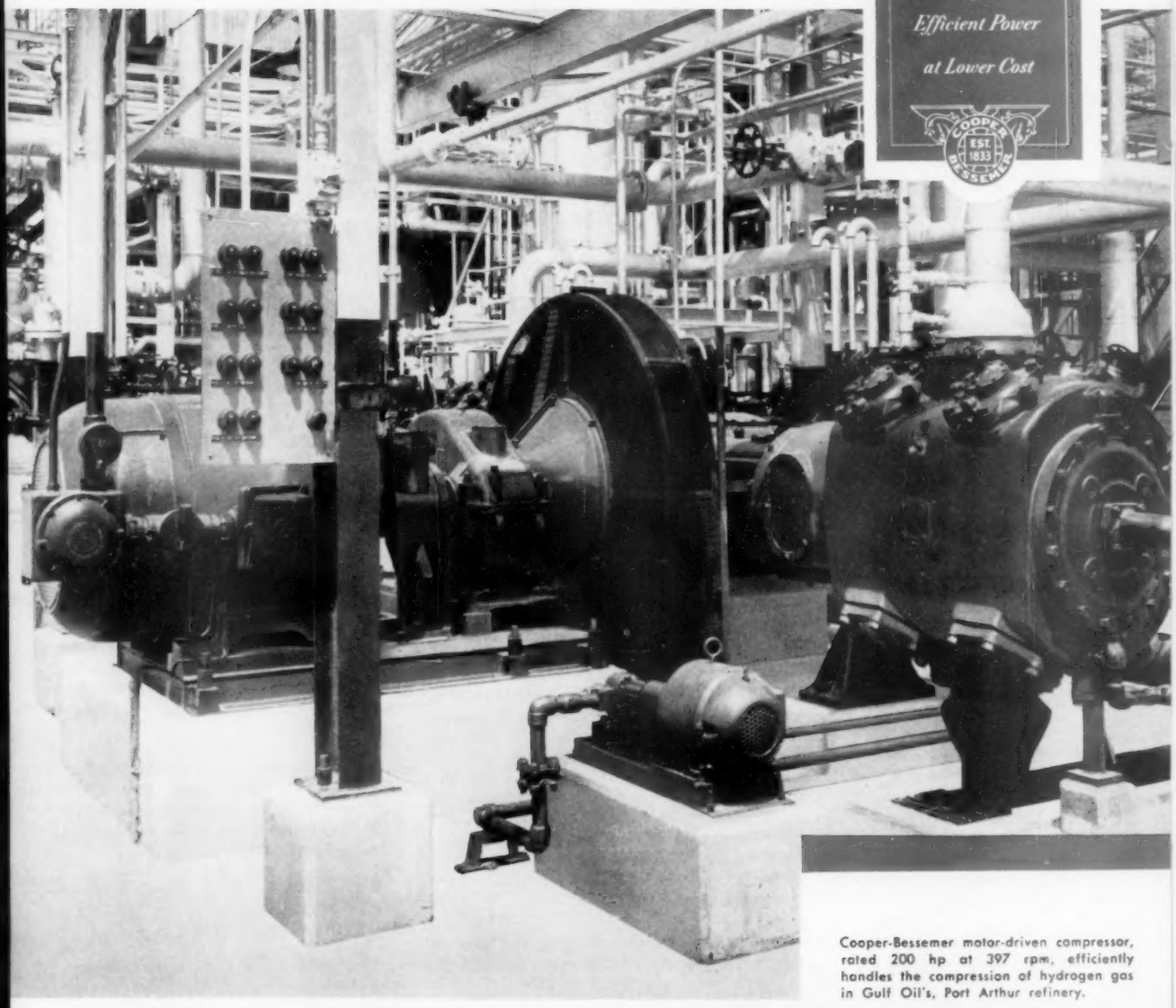

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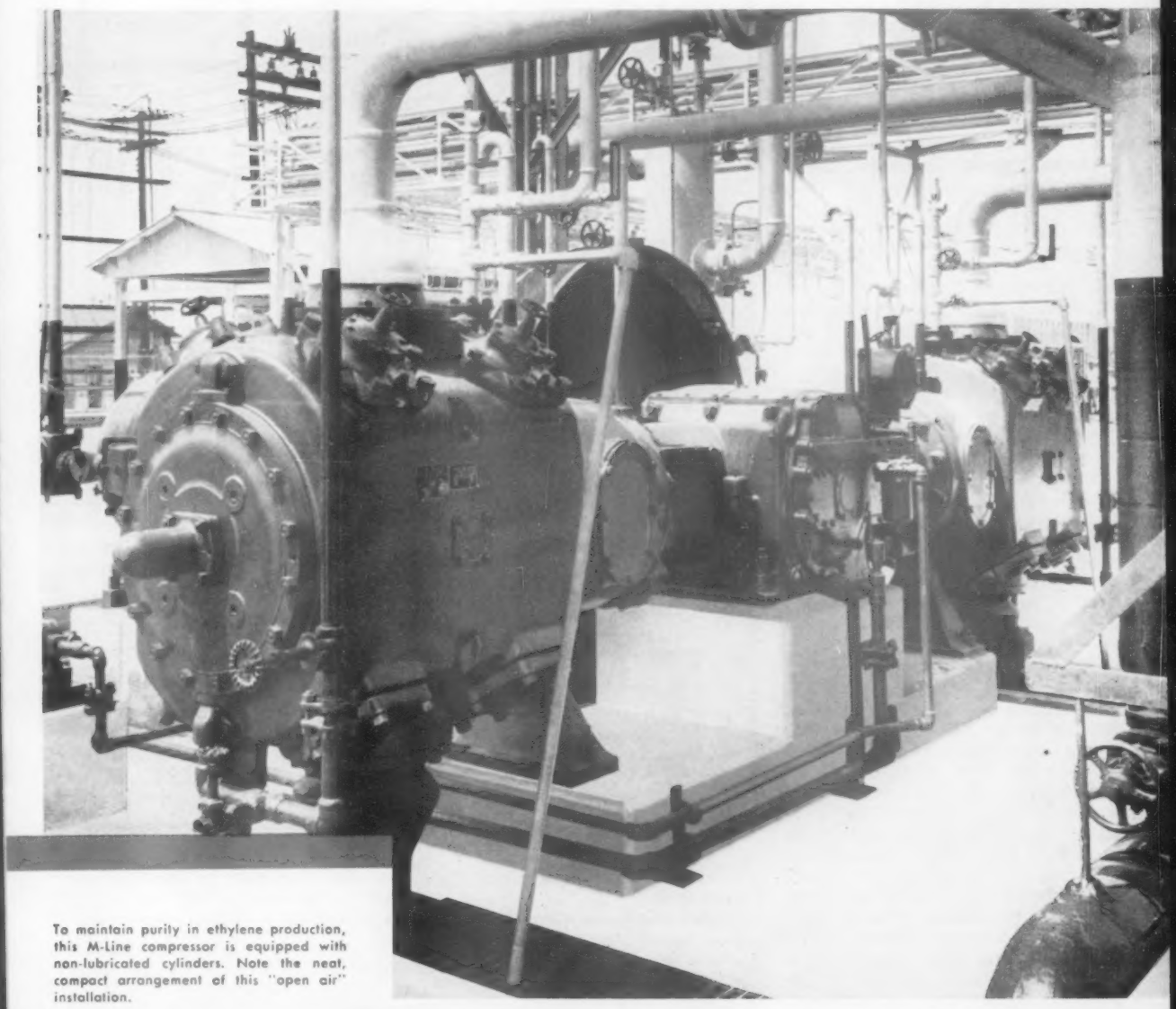

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Dozen areas share in '56 exploration excitement

by Frank J. Gardner
Exploration Editor

IT was a remarkable year for oil exploration in the United States and Canada. Remarkable, because it was unusually productive. And productive both in new reserves and new knowledge.

From the bleak prairies of Peace River to the sunny coast of Alabama, important new oil and gas fields were discovered. And in the process, oil finders opened new geological and geophysical vistas for future exploration. Some old theories were discredited, as new ones moved in. Such upheavals in discovery thinking inevitably lead to revised approaches in old provinces and bold new aggressiveness in unexplored ones.

Several large basins and uplifts of regional expanse finally fell before the 1956 onslaught of exploratory drilling and yielded production for the first time, after having defied the oil finder for decades. Most important among these were the Paradox basin, the Las Animas arch, and the cluster of piercement salt domes in the East Texas basin.

Four objectives . . . The 1956 drilling campaigns were aimed at four main objectives: ever-greater depth, intensified subsurface search for stratigraphic traps, reexamination of long-known structures for new traps, and increased discovery through new methods of drilling and completion. New concepts in seismic work, well logging, and drilling began to make themselves felt as operators wrung commercial production from prospects that would have been condemned as dry 5 or even 3 years ago.

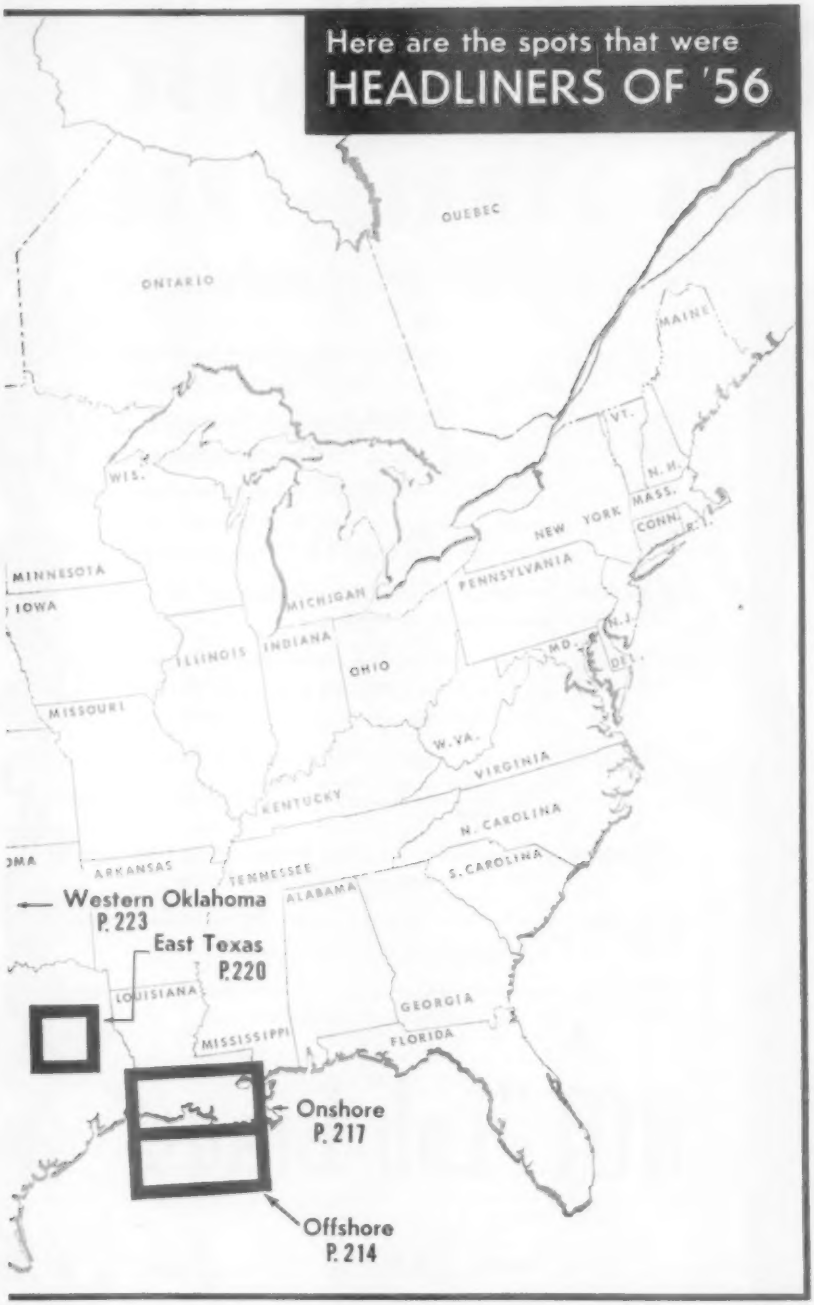
Because of these approaches, 1956, was a year of extraordinary progress in oil-finding. Of the many important exploration events of the year, those of greatest significance are centered in the localities blocked off on the map. Brief summaries of newsmaking events in each of these localities are given in the pages that follow. Of them all, perhaps these 10 are the top stories of 1956:

1. The emergence of the Paradox basin of southeastern Utah and northern Arizona as a major source of oil.

2. The discovery of regional stratigraphic traps for oil in the San Juan basin of northwestern New Mexico.

3. The oil strikes on two previously condemned salt domes in East Texas, and their impact on salt-dome exploration throughout the Gulf Coastal region.

4. The completion of the world's



deepest well at 22,570 ft. in South Louisiana, and the finding of commercial oil pools at depths below 20,000 ft.

5. The sensational strike at Red Earth Creek, Alberta, in a granite-wash stratigraphic trap, which set off the greatest land rush in Canadian history.

6. The expansion of a 50-mile trend of deep Edwards-Lower Cretaceous reserves in Southwest Texas at depths below 10,000 ft.

7. The rare discovery success ratio of one producer for every two wells drilled in northern British Columbia and a nearly-as-good ratio of 46 per cent in offshore Louisiana.

8. The burgeoning Panhandle discovery campaign in the western Anadarko basin of Texas, Oklahoma, and Kansas.

9. The emergence of Alabama's Citronelle field as a major oil field within 9 months of its initial discovery.

10. The discovery of oil and gas on the previously dry Las Animas arch of eastern Colorado.

Depth targets grow . . . An outstanding feature of the United States exploration program in 1956 was the increase in depth targets for wildcat wells. This trend was accented, of course, by the discovery of oil in the world's deepest well, Richardson & Bass 1 L. L. & E.-Humble State in Plaquemines Parish, Louisiana. Carried to total depth 22,570 ft., and completed at 21,465 ft. for about 200 bbl. per day, this pioneer effort proved for the first time that oil can exist in commercial volume at depths below 20,000 ft.

Other operations in South Louisiana saw five wells drilled to depths exceeding 18,000 ft., and 54 wells to depths between 16,000 and 18,000 ft.

In the Williston basin, Amerada Petroleum Corp. 1 Iverson-Nelson Unit was probing the deep formations of the Nesson anticline, and at year's end, was still pushing down to 13,500 ft. for a look at rocks of Winnipeg-Ordovician age.

Oklahoma awakened to a new deep hope for major oil and gas pools as British-American Oil Producing Co. finished its 2 Harrison, in Grady County, at 15,310 ft. for 175,000 M.c.f. of gas per day plus 24,150 bbl. daily of condensate.

Other states saw drilling depth records broken (see page 147), and the depth search can only be accelerated in years to come.

The supreme exploratory achievement of the year, however, was the opening of major oil production in the Paradox basin. Here, in an area that was once described as "barren and worthless, and good only for holding the world together." The Texas Co., Shell Oil Co., and others have uncovered a series of excellent oil fields in the Paradox-Hermosa-Pennsylvanian. With well potentials of 1,500 bbl. and up, these operators have demonstrated that relentless subsurface study can unlock the secrets of such evaporite basins as this. Many similar basins yet unproductive may be added to the producing list as the result of lessons learned at Paradox.

Remarkable 1956 was long in coming. Not since 1951 has there been a more productive year. Perhaps the stimulus of this success will result in an even more remarkable 1957.

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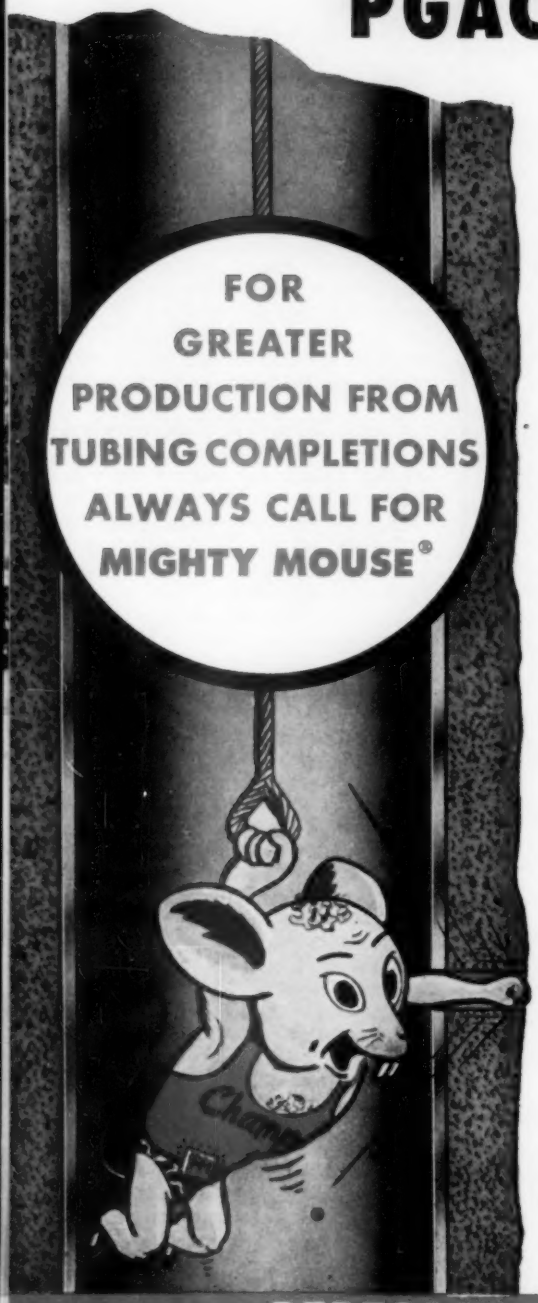

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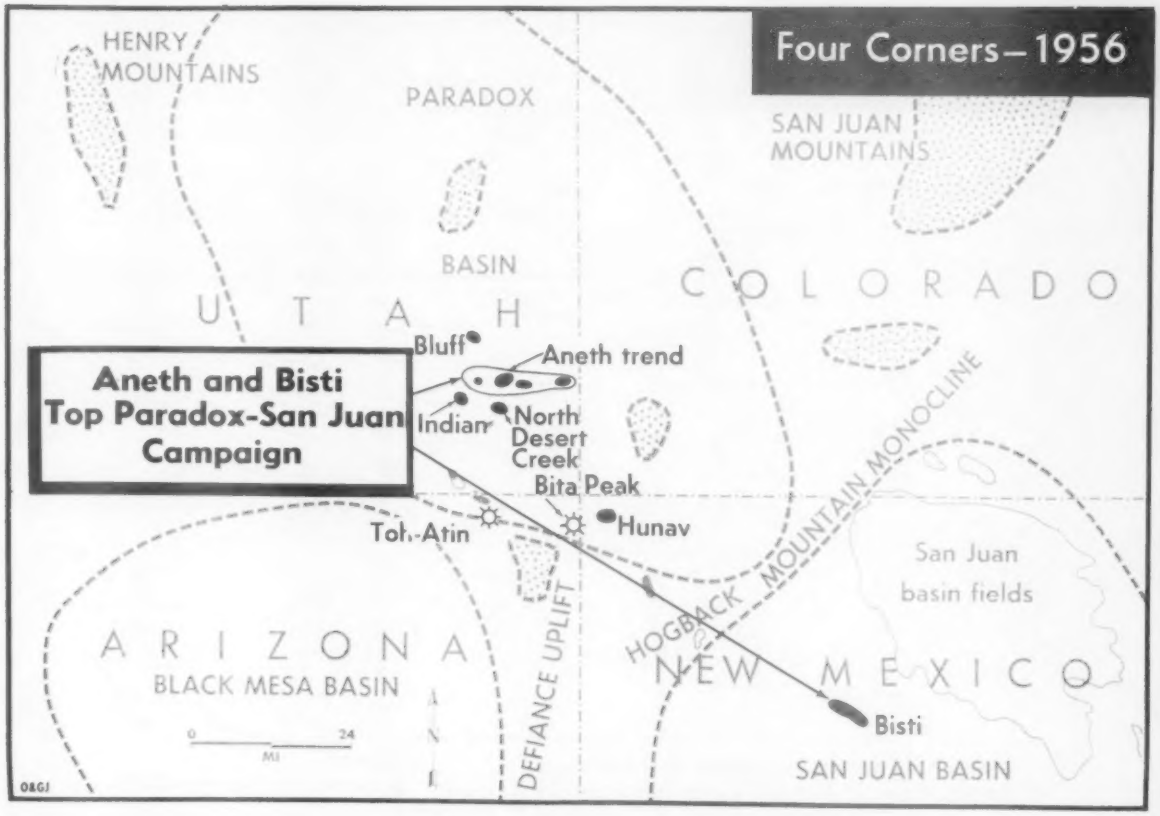


What happened

● Top 1956 exploratory news came from the Paradox and San Juan basins. Utah's big strike was Aneth; New Mexico's were Bisti and Hunav; in Arizona it was Toh-Atin and Bita Peak.

The Aneth trend now embraces an area comprised of Recapture Creek, Aneth proper, and new discoveries at Bluff, Indian, and in the North Desert Creek area.

. . . Aneth. Texaco opened Aneth at 1 Navajo, San Juan County, in March. Oil flow was 1,704 bbl. daily from Paradox-Pennsylvanian at 5,700 ft.

. . . Bisti. El Paso Natural found Bisti-Gallup field in 1955 at 1 State, San Juan County; development lagged until March 1956 with completion of British-American's 1 Marye at Black Rock. The two fields have now merged. They produce from Gallup-Cretaceous sand at 5,000 ft.

. . . Hunav. Humble opened this Paradox field in New Mexico's San Juan County at 1-B Navajo in May with production of 20 bbl. hourly at 5,400 ft.

. . . Arizona. Franco-Western 1 Navajo opened Toh-Atin gas field in Apache County in August with production from Paradox at 5,359 ft. El Paso and Stanolind discovered Bita Peak, Apache County, with production from Paradox at 5,049 ft.

What it means

● The Pennsylvanian discoveries in the Aneth region herald the Paradox basin as a major oil province for the Rocky Mountains. The discovery of Paradox oil at Aneth is considered the most significant exploratory event in the Rockies since Beaver Lodge, North Dakota. This prolific Paradox producer has taught us a strat-trap lesson for the future. We are learning how to find stratigraphic traps by use of facies and stratigraphic studies. Aneth's success is one of the brightest exploratory stories in the Rockies, and the nation, in recent years . . . Aneth is a step in cracking previously barren basins.

. . . Bisti. Strat oil, easy drilling, and large proved acreage are some reasons why Bisti is a bright new hope for the oil future of the previously gas-producing San Juan basin. Bisti has proved that Cretaceous oil can and does occur in commercial quantities in northwestern New Mexico. Until recently it was thought that the Cretaceous sands in the San Juan basin were primarily gas zones. Bisti has changed all that.

. . . Arizona. The two new gas fields in Arizona emphasize the importance of that state's potential producing prospects. There are now four producing wells in the Grand Canyon State; 2 years ago there were none.

What's ahead

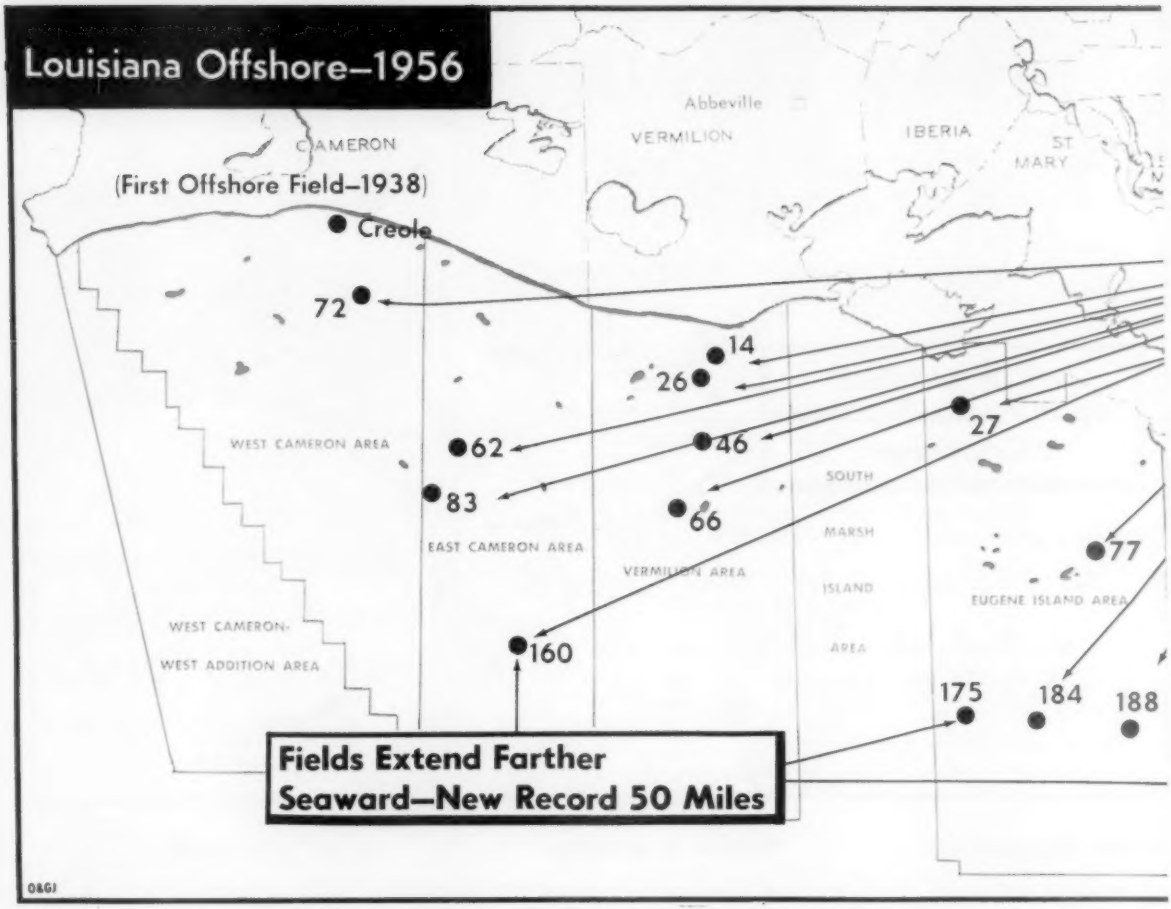
● Bold, successful exploration in the Four Corners opened the doors to one of the nation's most hopeful future petroleum provinces. Aneth and Bisti appear to be only the beginning. Future discoveries in and around both fields will divulge a new national source of oil that was previously unsuspected.

. . . At Aneth. Look for important wildcat drilling in the Paradox basin in 1957. The Aneth trend is now 20 miles long. Where will it end? New Year exploration will give us some clues . . . and, some new Paradox fields.

It now appears that the Aneth trend will move westward in future drilling, and there is nothing to stop it from moving into Colorado on the east side. Reserves are estimated to be well over 100 million barrels.

. . . At Bisti. This strat-trap prize is a mere dent in the San Juan basin's oil potentialities. Recent discoveries south and east of Bisti are tapping a bigger producing area than was previously expected. The Gallup sand will be in for close scrutiny in 1957.

. . . Arizona. This state may well rival its Four Corners neighbors in its bid for fresh exploratory interest if someone gets a really big well in the Paradox or Hermosa. Upper Cretaceous possibilities are not to be overlooked either.



What happened

• Twenty-two more fields were found last year in the Gulf of Mexico off the coast of Louisiana. These boost the total of Louisiana's offshore fields to 91, including those in Breton and Chandeleur Sounds, off the east side of the coast.

Discoveries of 1956 did not equal in number those of the preceding year which totalled 27. The reduction in number resulted from the dispute between State and Federal Government over boundary lines which hampered drilling operations for several months during late summer and early autumn.

A compromise agreement, effective October 12, permitted operations to be resumed in the disputed area, and since then there has been a steady increase both in drilling and in rate of discoveries.

At the close of the year there were more than 90 active operations in Louisiana's offshore areas, setting a new all-time record.

Of the 22 new fields, 6 were productive of oil. The remaining ones were classed as gas discoveries. Most of these were also condensate-productive.

Altogether, 1,747 wells were completed during the year. Of these, 434 were classed as exploratory, including extension tests, new-pay discovery wells, and strictly wildcats. The remaining 1,313 were field-development wells. Productive wells completed totalled 1,050, including 900 in field development, and 150 classed as exploratory.

Drilling during the year moved both farther offshore and also into deeper water than ever before. Three of the year's new fields were about 50 miles from land. Deepest water in which drilling was conducted was 112 ft.

Greatest concentration of offshore activity, both in exploration and new discoveries, and in field development, continued to be around the Mississippi River delta area of Plaquemines Parish. South Pass Block 24 field, at the tip of the delta, and Main Pass Block 69 field, off the east side, continued to lead in field development. The former, the state's largest and most prolific offshore field, added more than 70 wells, bringing its total to more than 315. Main Pass Block 69 field added more than 30 wells. Daily average production at South Pass 24 field now totals about 63,000 bbl.

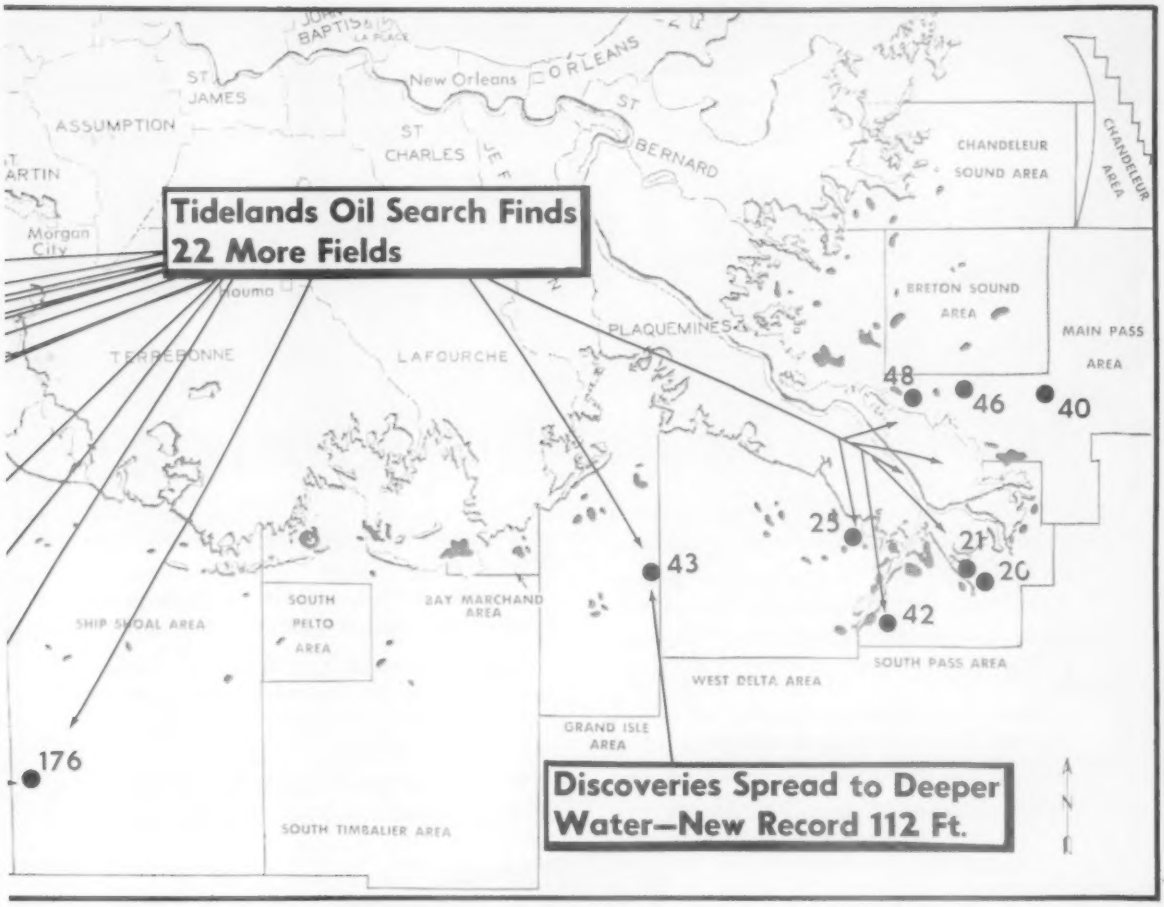
What it means

• Louisiana's offshore development last year not only added substantially to the state's currently known oil and gas productive capacity but also gave further ammunition for predictions of vast potential reserves to be exploited along the Continental Shelf. It added assurance to previous conceptions that the state's greatest remaining source of new oil and gas lies in its offshore areas.

Discoveries scattered along the entire coastal frontage attested to the widespread scope of the potentialities, and indicated continued exploration eventually will prove a field density comparable to that of the state's onshore areas.

Extension of exploration further offshore and into deeper water reflected the industry's ability to overcome the handicaps and problems of operating at long distances from land bases and in water at great depths when occasion demands. Discovery of three fields 50 to 55 miles from land, and another in water 112 ft. deep, although closer to shore than the others, proved that at least those conditions are not barriers.

Drilling at such distances from land



and in water so deep opened an additional broad area of the outer Continental Shelf for exploration. It discounted earlier beliefs that offshore development might necessarily be limited to a relatively narrower stretch of the shelf closer to land and in comparatively shallow water.

Significant again in the year's operations was the relatively high success ratio, amounting to more than 61 per cent in over-all drilling, and about 35 per cent in exploratory wells. This was indicative not only of the newness and virgin nature of offshore development, but also of the efficiency of modern exploratory efforts.

That all except six of the year's new discoveries have been found productive mainly of gas so far does not detract from their rated importance. Like most South Louisiana fields, all are known to possess a multiplicity of potentially productive sands and reservoirs, many, or some of which can be expected to be oil-productive. In only a few of the newer fields have more than their respective discovery wells been completed. However, the extensive potential gas reserves indicated represent a valuable asset.

What's ahead

● It is general opinion that development so far has only scratched Louisiana's offshore potentialities. Although more than 90 fields have been found already, these represent only a fraction of the number of prospective salt domes and structures which have been indicated by geophysical exploration to date.

There is no reason to assume that the density of offshore fields will be any less than that of Louisiana's adjacent onshore area. On this basis, fields remaining to be found are many times those already discovered, which are widely scattered. It also seems certain there will be just as many big fields, proportionately, as onshore.

Drilling exploration actually is only beginning to get under way. Although the first offshore field (Creole, off the coast of Cameron Parish) was opened in 1938, there was no further activity except in that field, until 1947, when Kerr-McGee Oil Industries, Inc., drilled the discovery well of Ship Shoal Block 32 field, off Terrebonne Parish.

Since then development of offshore potentialities have been gaining momentum. Rate of development has been slowed by various factors. Not the least of these have been the necessity for operators to make preparations, develop, and build up special marine facilities, and gain know-how needed for a new type of operation. High costs and other conditions which limit operations to a relatively few large companies or groups of well-financed operators, and the long-standing dispute between State and Federal Governments over ownership, are other hurdles to be overcome.

The situation now is beginning to reach a point that development can be greatly accelerated with the possibility that drilling during 1957 will be nearly double what it was the past year. The expanding play and opportunities are attracting a rapidly increasing number of companies, both as operators, drilling contractors, and service organizations, which, in turn, will further expand the activity.

Much new work is ahead just in developing the more than 90 fields already found. Multiple sands and reservoirs, characteristic of most South Louisiana fields, and extending to great depths, leave much to be explored, even without any more fields being found.

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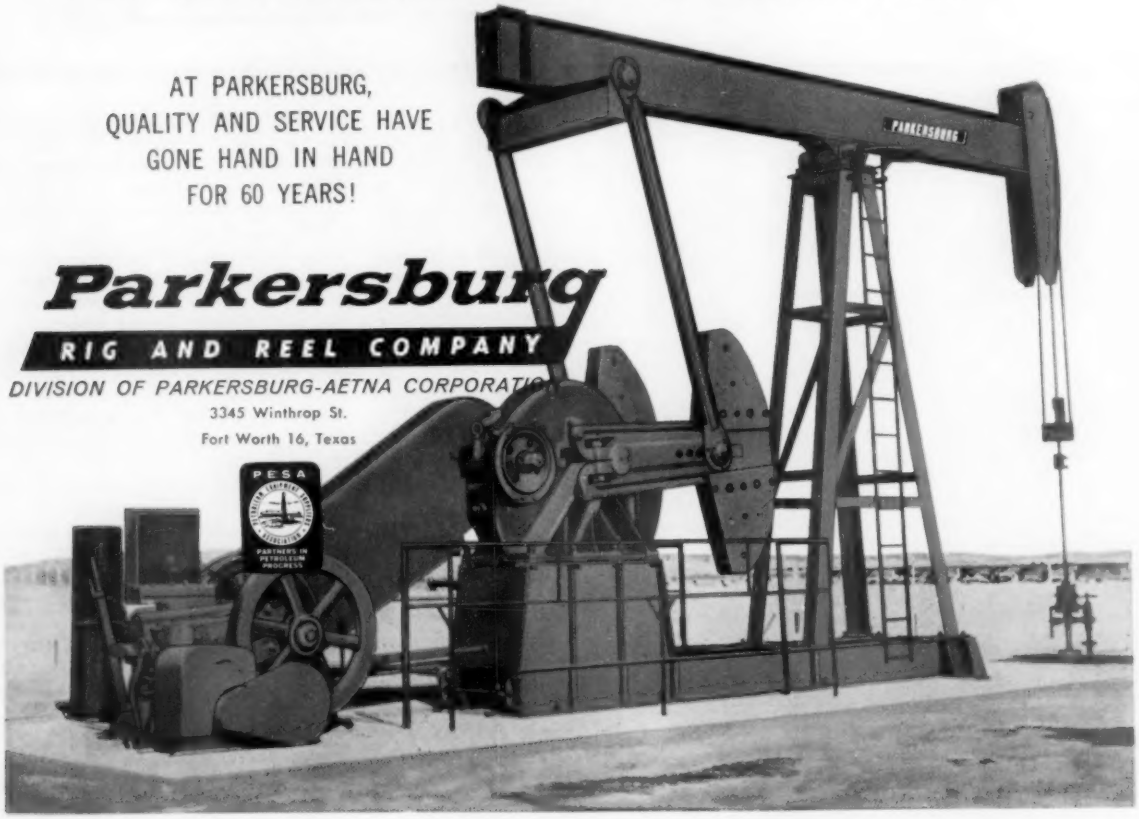
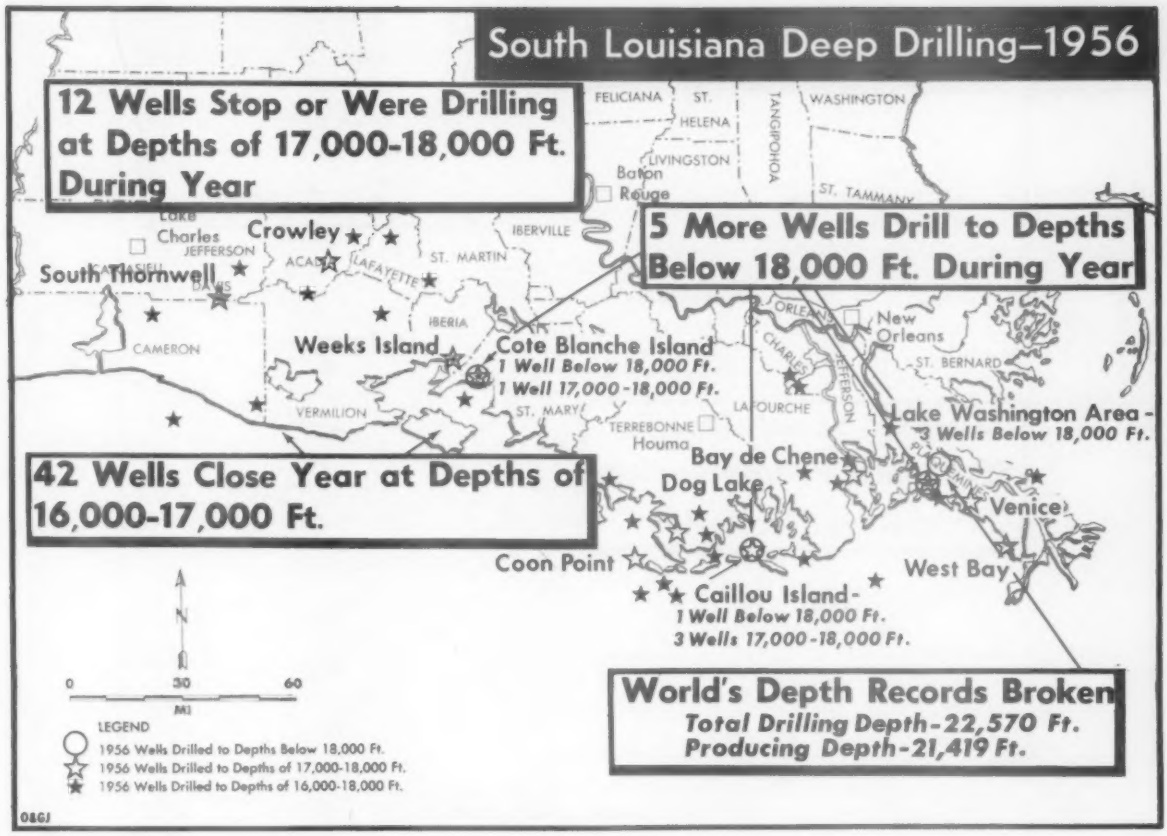




What happened

● South Louisiana drilling and production reached to new record depths during 1956, and increased in volume at progressively lower levels. Ultradeep drilling dominated the district's exploration and development during the year.

The district's deep drilling and production shattered world depth records when Richardson & Bass completed a wildcat in Plaquemines Parish's Lake Washington area with bottom of hole at 22,570 ft. and bottom of producing interval at 21,465 ft.

Two other wells in the Lake Washington area were drilled to depths below 18,000 ft. One, still drilling, was below 19,200 ft. at the year's end. Two other wells, one at Cote Blanche Island, in St. Mary Parish, and the other at Caillou Island, in Terrebonne Parish, went to below 18,000 ft.

Twelve wells in 10 areas drilled to depths of 17,000 to 18,000 ft., 42 others in 35 areas went below 16,000 ft., while 93 others in more than 70 areas closed the year at depths of 15,000 to 16,000 ft. Fifteen more fields joined the list of those with production below 15,000 ft.

Four South Louisiana fields have production in sands at depths below 16,000 ft.

What it means

● Ultradeep drilling in South Louisiana during 1956 not only strengthened this district's dominant position among deep drilling areas of the world but gave additional incentive for more general exploration at greater depths.

Completion of a commercially productive oil well at the new world depth record of 21,465 ft. served to dispel previous doubts that oil could be found at great depths, or that sands at those depths would have the necessary porosity and permeability to yield oil.

The deeper drilling generally over the district brought to attention more than ever before South Louisiana's great thickness of sedimentary beds, and potentialities for ultradeep exploration. At its total depth of 22,570 ft., the world's deepest well still was in Miocene beds.

It further revealed that the prospects for still deeper drilling may be limited only by mechanical and economical capacities of the industry to reach greater depths.

Discovery of production in sands at great depths may call for a reappraisal of many old prospects condemned by previous shallower drilling. A revaluation of potentialities of drilling at more outlying locations off flanks of many old heavily explored domes is probable.

What's ahead

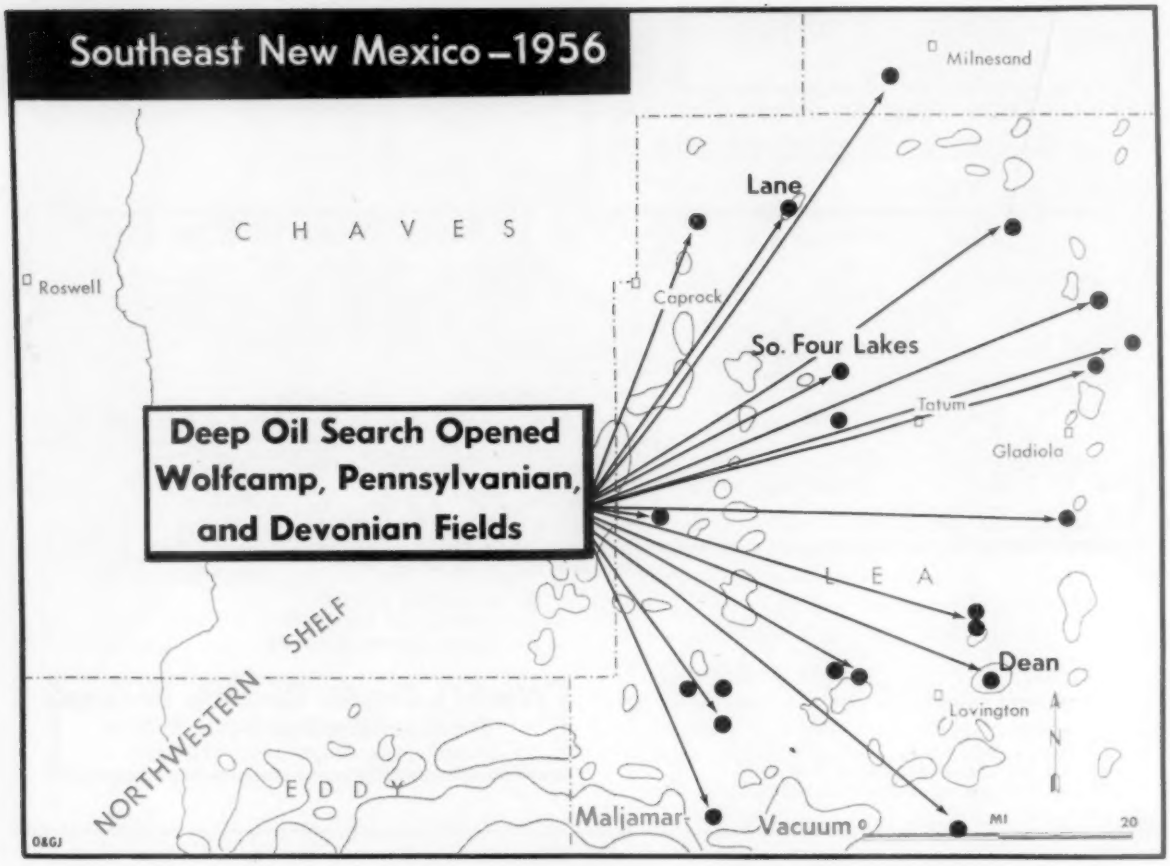
● The next and succeeding years should witness a continuing spread of exploration in South Louisiana deeper horizons and an intensification of drilling at progressively greater depths.

Nearly all the ultradeep tests so far drilled have had showings of some kind, and with commercially productive oil already proved as deep as 21,465 ft., the incentive for much additional exploration at these levels is not lacking.

These deeper horizons are recognized as the district's greatest remaining realm for exploration outside of its comparatively new offshore areas.

A rapidly increasing number of wildcat tests, particularly those located in the more coastward areas of thickening Miocene beds, are being started with depth objectives of 15,000 ft. and deeper. At least one test, located in the Lake Washington area, Plaquemines Parish, is drilling ahead below 19,200 ft. with intention of going below 20,000 ft., and possibly to the 21,465-ft. producing level of the deepest well.

At the present rate general development is moving to progressively greater depths. It may not be long before 15,000 ft. in South Louisiana will be looked upon as shallow drilling.



What happened

● A 24 per cent success ratio made Southeast New Mexico outstanding in 1956. Deep exploration was the keynote, especially in central and northern Lea County.

Pre-Permian successes came rapidly, in a north-south trend along Lea County's eastern border. They spread across its northern stretches and established fields in undrilled territory.

New finds in the Devonian predominated. Strikes like South Four Lakes and North Gladiola were exceptional, but Lane, Dean, and other fields gained important extensions plus new pays. Some of the new fields were opened to Devonian production, later added Pennsylvanian and Permo - Pennsylvanian producing sections.

The map shows only these deep discoveries, with depths of 10,000 ft. or more. Other areas and counties not shown came in for their usual share of Permian exploration. Many new small pools dot the area surrounding the old Artesia-Premier-Maljamar-Vacuum trend, where production is Delaware, Queen, Grayburg or San Andres. A few extensions were made outside the trend fields on Central basin platform, from Monument to Jal.

What it means

● Southeast New Mexico's discovery and development pattern, prior to 1956, held pretty close to the old established trends. By mid-1956 the picture had changed and exploration shifted to the north in Lea County, completely out of the so-called trend fields. The northernmost discovery on the map is a Pennsylvanian opener near the town of Milnesand in southern Roosevelt County.

Reason for the new trend toward Devonian production lies in its reservoir characteristics which give it good average oil recovery. And the operator can look at a number of prospective zones while going toward the main objective.

For comparison, seven Devonian discovery potentials ranged from 75 to 2,640 bbl. a day, and averaged over 900 bbl. A like number of Pennsylvanian discoveries ran from 120 to 792 bbl., with an average of 400 bbl. on completion gage.

In addition to the Devonian search, New Mexico operators are applying new recovery methods to old areas, resulting in shallow drilling in Eddy and southern Lea County.

What's ahead

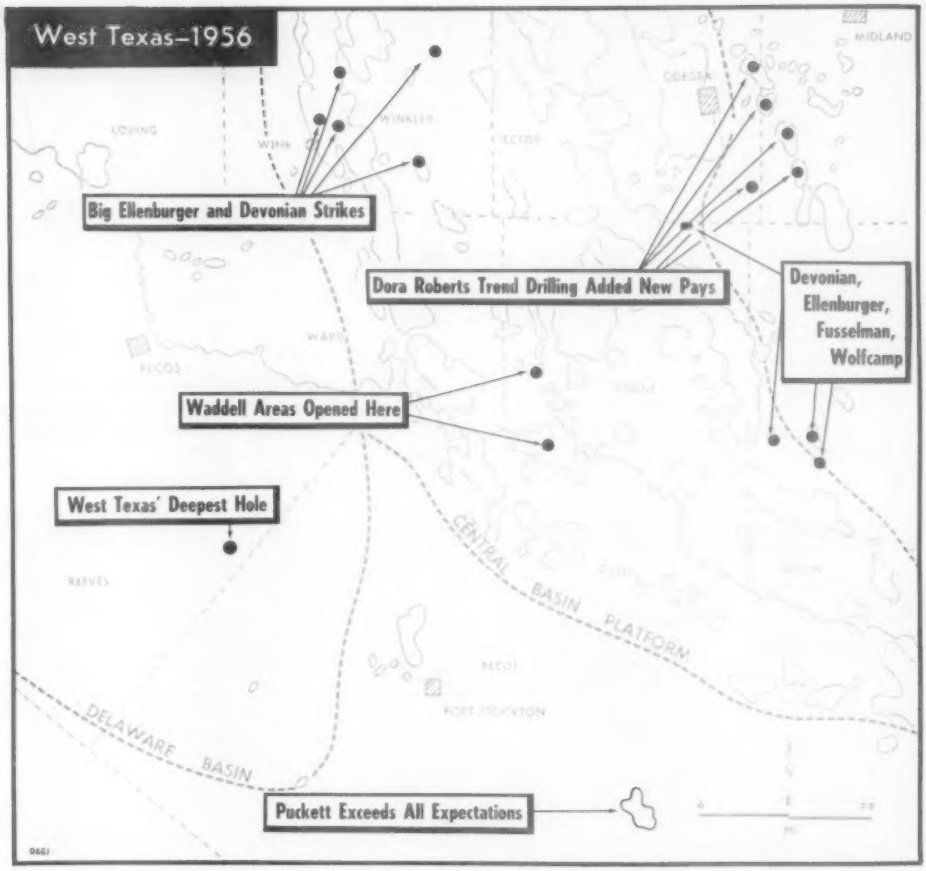
● The first evidence of confidence in Southeast New Mexico's deep possibilities is a year-end tally of drilling operations, contracted to 10,000 ft. or more. The count was 56 drilling, plus a half dozen in the location stage.

Operators say the Devonian will be the main objective in the year to come. As the map shows, exploration has already opened numerous pools that have moved the production picture inward toward the buried sea channel area between the parallel trends of fields on either side of Lea County. This same area will come in for further development.

Explorationwise, this area has been held back by high-cost short-term leases, and small-tract ownership. These factors make it hard to put together a block big enough to make a deep test attractive.

High costs will remain but encouragment is offered in the way of drilling units to build up lease blocks, and prospects of multiple pays. New Mexico's operators say the outlook is good.

The high success ratio in northwestern shelf fields has apparently lowered current interest in New Mexico's portion of the Delaware basin.



What happened

● The persistent search for oil in West Texas accounted for new oil in both new and old areas. Devonian and Ellenburger strikes on Central Basin platform were top news in 1956.

An impressive number of good Ellenburger discoveries were made in Winkler County, and also a series along the eastern edge of Central Basin platform that ranged from Wolfcamp to Ellenburger.

Some of the basin's most important discoveries were gas distillate, much as those in Winkler County, north and east of Wink. Shell and Phillips' 1 McCabe, one of three big wells in this area, opened Emperor-Devonian field with a calculated potential of over 100,000 M.c.f. gas, plus a yield of 5,600 bbl. of distillate.

Pucket field gained many big gas wells, giving it an estimated 10,000 acres proved reserve for both Devonian annd Ellenburger formations.

... **Dora Roberts trend** fields saw many of their original Ellenburger wells depleted and a program was under way on recompletions in new pays. Many are now multipay fields.

What it means

● Emphasis in West Texas is on pre-Permian search at ever-greater depths. This campaign was accented by the drilling of West Texas' deepest hole at Gulf 1 Northrup in Reeves County in the Delaware basin.

From the number of widely scattered discoveries during 1956 it follows that more oil will be found in nearly all areas. Leases are harder to pick up, more seismic work may be required, but at the same time wildcatters are adding new pools at a rate that has kept West Texas pipeline capacity at a premium.

It is safe to say that 1957 will see even greater activity throughout all of West Texas.

... **In addition,** there is a strong campaign for the revival of Permian fields. An example is Means field, Andrews County, where for 22 years drillers had overlooked the tight Queen sand. This sand lies above the field's regular pay. Now, formation fracturing, electric logging, and improved sample analysis is giving the field new production life. This is only one area. The same program is under way up and down Central Basin platform.

What's ahead

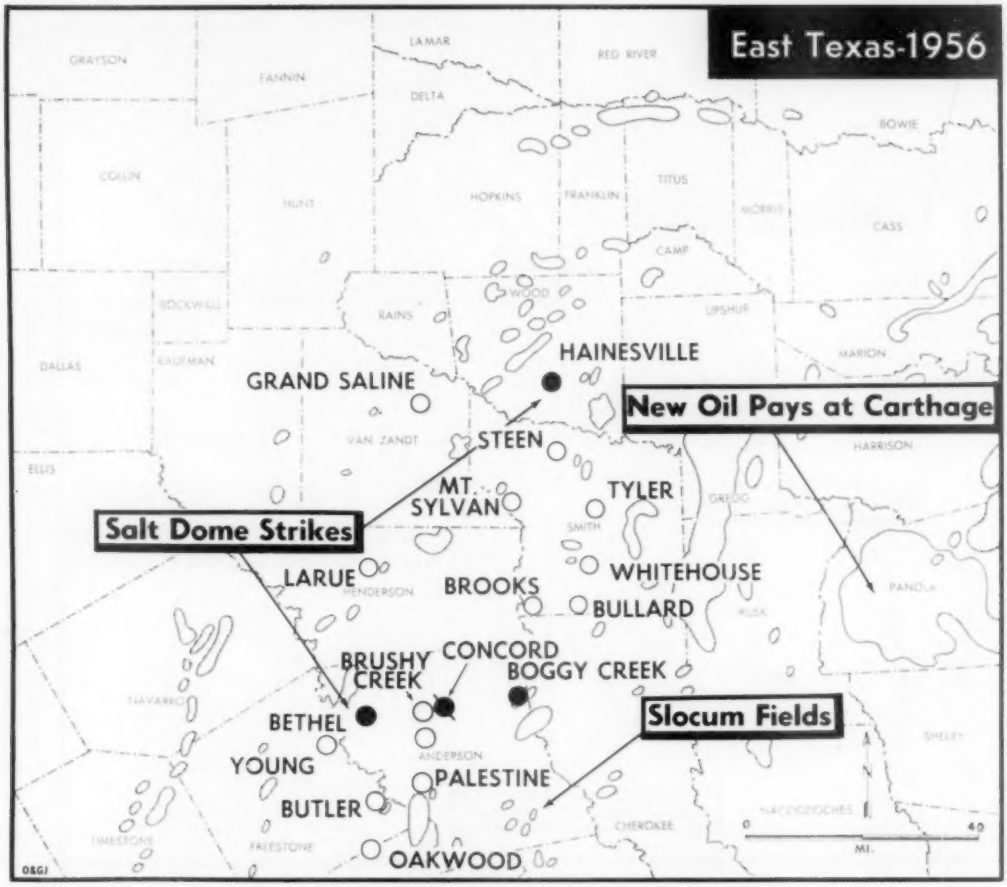
● West Texas oil exploration is slanted in four main directions: Toward greater depth, the reexamination of old structures for new traps, subsurface search for hidden strat traps, and new methods of drilling and completion.

... **West Texas** still looks toward the Spraberry as having great production possibilities. New methods of completion have made thin sands of the Clear Fork and Queen sections profitable enough to be the main objective in drilling; and have put operators a step nearer the solution for the even tighter Spraberry.

Since Puckett field is considered the largest dry-gas reservoir yet found in West Texas, it is conceivable that additional exploration will be made in this geological area—the Sheffield channel and Delaware basins.

Two major companies have already paid large bonus prices for University of Texas land tracts, and have tests under way. These are on a northwest trend play from Puckett.

West Texas can look forward to more Permian drilling along with its search for the deep Ellenburger and Devonian rocks.



What happened

● Biggest 1956 exploration news in East Texas was oil found on two more of 18 known piercement salt domes. The oil is fairly small, (three wells on two domes). But the oil possibilities of these salt domes have challenged geologists for years. Only four have ever produced.

The two domes opened were Hainesville in Wood County, and Bethel, Anderson County. Both were completed in the Woodbine.

... East Texas had a good drilling play near Slocum townsite, southeastern Anderson County. In quick succession, sub-Clarksville and Woodbine discoveries opened four separate fields. Best production was in Woodbine, at 5,600-5,800 ft. The sub-Clarksville zone is just above the Woodbine. Initial potentials ran as high as 250 bbl. per day.

... In Panola County discoveries and new pays were added to Bethany field, (extreme northeast corner of the county), and along the southwest flank of Carthage field.

What it means

● Seismic work on the two new producing salt domes played a major part in finding oil, and should provide the key to a restudy of other domes. British-American 1 Wisenhunt at Hainesville was aimed at precise penetration of the salt overhang, so that a maximum number of sands flanking the salt might be probed. It found first oil showings in the Eagle Ford, again in the sub-Clarksville, and was completed in Woodbine.

... Conclusions that have come from study of salt-dome structures are: Flank structure on these domes is likely to be more complex than was previously supposed; subsurface study is probably inadequate in the light of today's new knowledge and tools; and probably an entirely new approach is needed on these inland domes.

... The Texas Co.'s first successful well on its Williams lease at Bethel made a small pumper in Woodbine at 5,622 ft. The third attempt on the same lease may have been a new pay. It flowed 140 bbl. daily from Woodbine sand at 5,758 ft.

What's ahead

● First of new work on old salt domes has been slated at LaRue in southeast Henderson County. C. L. Norseworthy, Jr., 1 Abercrombie will explore sub-Clarksville sand pinchout and domal faulting.

This is only the beginning. Finding of oil at Bethel and Hainesville set off a lease play not only on other domes in East Texas, but extended into Mississippi and Louisiana.

Exploration drilling can be expected wherever there are salt domes.

East Texas drilling periodically slumps but always manages to make comebacks. Except for faulting, the Slocum fields are not yet defined and should see further development.

Additional big gas-distillate wells can be expected in the East Texas border counties, plus more exploratory work in the Crane trend. The latter is a continuous narrow band of lower Pettet limestone extending from western DeSoto Parish, Louisiana, in a northwesterly direction to within 7 to 8 miles of Longview, Tex., in Gregg and Harrison counties.

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What happened

● The big discovery stories of 1956 in the Hugoton embayment came from southeastern Colorado's Las Animas arch; western Kansas; Harper County, Oklahoma; and Ochiltree County, Texas.

... In Colorado. D. D. Harrington opened Lubers field in Bent County at 1-A Earl. This Pennsylvanian gas discovery flowed 10,000 M.c.f. per day. Location of this second commercial producing area in the Las Animas arch region is 14 miles southeast of Bent's Fort field.

... In Kansas. Skelly Oil Co. opened Sexson field at 1 Sexson in Wallace County. The Morrow hit flowed 14,000 M.c.f. of gas daily. Location is near the east flank of Las Animas arch.

... In Oklahoma. The Laverne district of Harper County is rapidly filling up Sections 10-26n-25w and 24-26n-25w. Production is from Hoover, Tonkawa, Morrow, all Pennsylvanian, and Chester-Mississippian.

... In Texas. New discoveries in western Ochiltree and eastern Hansford County in pre-Permian rocks connected the prolific Hansford and Farnsworth areas.

What it means

● Rank wildcatting and field development in the Hugoton embayment ran side by side in 1956. The five-state area enjoyed its busiest year in its short pre-Permian history. The year's happenings prove that Hugoton has a long way to go in deep exploration.

... Las Animas. The recent discoveries on the arch and its environs are not world shaking in their potentials, but they go to show that a virgin wildcat territory has been neglected much too long.

... Harper County. The Laverne pre-Permian development substantiates the belief that untold Pennsylvanian and Mississippian reserves lie under northwestern Oklahoma counties. Harper is rapidly becoming another Beaver County. Harper's success opens many thousands of square miles to Morrow prospecting.

... Ochiltree. Pre-Permian success in this county is another step across the top of the Texas Panhandle from Hansford east, a march that began 4 years ago. It now appears that the area east of Hugoton gas field is one huge Pennsylvanian reservoir.

What's ahead

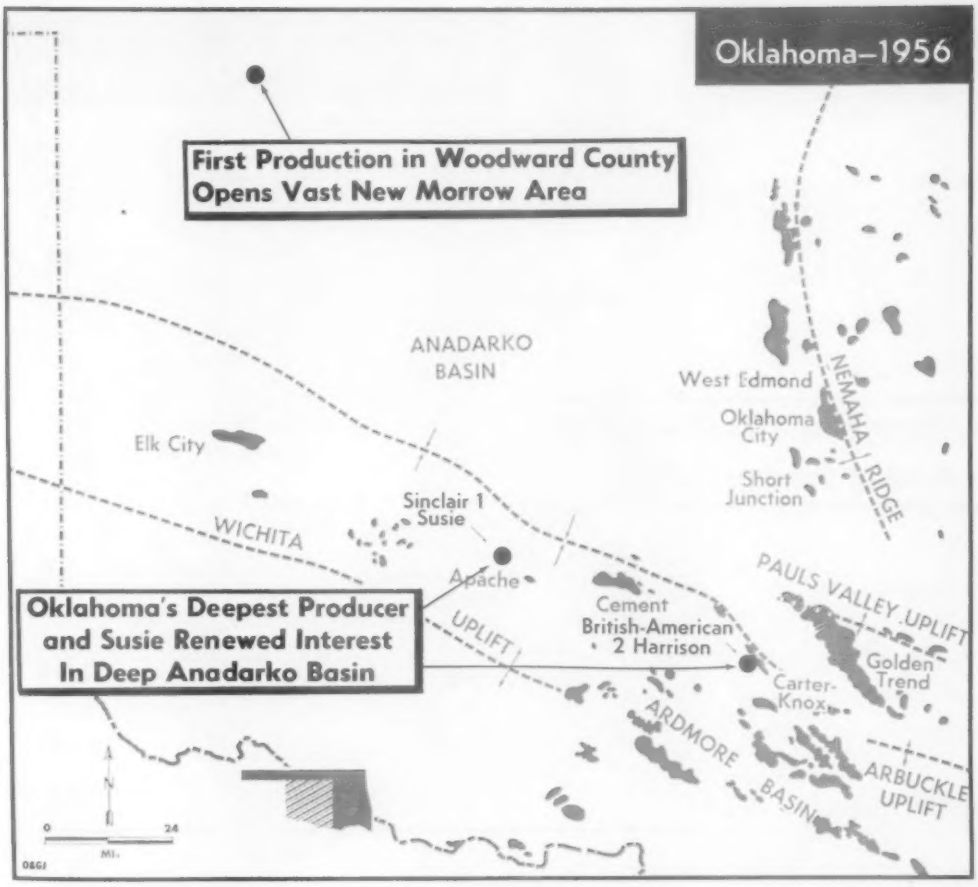
● Recent discoveries throughout the Hugoton province assure an unprecedented wildcat campaign there in 1957.

Look for a rather intensive search for oil and gas up the sides and on top of the Las Animas arch, deep inside Hugoton field in both Oklahoma and Kansas, new evaluation of the pre-Permian rocks in the Texas and Oklahoma Panhandles, and more wildcat success news from northwestern Oklahoma.

... In Colorado, Kansas. An enviable record of exploratory success in an immense stretch of virgin territory points to a fresh approach to oil finding on the long Las Animas arch and adjacent areas. A dozen wildcats are now probing the area. More will come.

... In Oklahoma. Year-end strikes in northwestern Oklahoma and in the Panhandle counties indicate an accelerated wildcat program in the immediate future. Fill-in drilling will increase the Laverne area's potential . . . more discoveries are certain in southeastern Beaver County.

... In Texas. Tie-in drilling will continue in the Texas Panhandle's Hansford and Ochiltree counties.



What happened

● Three discoveries, Susie, Harrison, and McCormick, took first place in Oklahoma's exploratory race.

... Harrison. In February, British-American completed 2 Harrison on the southwest flank of Carter-Knox field, Grady County, for a calculated open-flow potential of 175,000 M.c.f. of gas per day plus 24,150 bbl. of distillate per day, establishing the state's deepest production.

... McCormick. Union Oil Co. of California 1 McCormick, southeast of Woodward in Woodward County, was completed flowing 25,000 M.c.f. of gas per day plus 388 bbl. distillate on open flow from Morrow sand at 8,332-44 ft.

... Susie. In September Sinclair completed 1 Susie in Caddo County's Northwest Apache area. The well finaled flowing 533 bbl. of oil in 18 hours on 18/64-in. choke from Bromide-Ordovician sands at 8,700-8,907 ft.

The big three in Oklahoma discoveries were located in the deep southeastern corner of the Anadarko basin, on the flanks of the Wichita Mountains, and up in Woodward County near the basin shelf.

What it means

● The completion of excellent producers from the Ordovician sands in Grady and Caddo counties in southwestern Oklahoma, and pre-Permian gas and oil producers in northwestern Oklahoma brought renewed interest in the producing prospects for the deeper portions of the Anadarko basin and its northern shelf.

... Deep Anadarko. Up to now drilling has been mainly confined to exploration of the basin's border areas. Most of Oklahoma's big producers are found around the southern, southeastern, and eastern edge of the Anadarko basin. Most of the fields away from the basin edge are shallow. Susie and Harrison have changed this. Their discovery is another step in opening deep production in and around old areas, and, in virgin deep basin territory.

... Northwest. Union's 1 McCormick Morrow discovery opened a vast new area for Morrow prospecting along the northern shelf of the Anadarko basin.

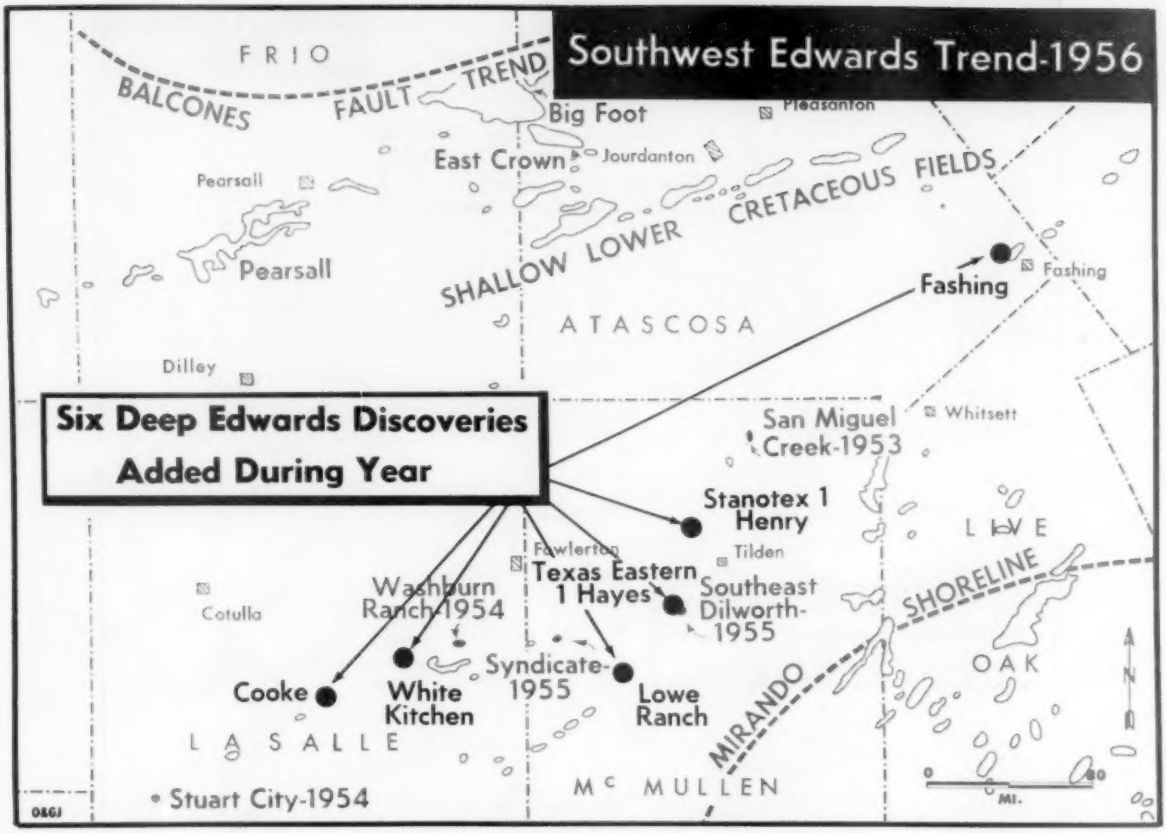
This Pennsylvanian strike in Woodward County is one of the most significant wildcat stories in Oklahoma.

What's ahead

● Increasing depth penetration is not the obstacle it was in the Anadarko basin. The discovery of prolific Ordovician production by British-American's 2 Harrison under Carter-Knox field, followed by Sinclair's 1 Susie discovery are indicative of the deeper possibilities for the producing fields of western Oklahoma. Some of the deeper prospects in this region that will see wildcat action soon are Cement, Chickasha, and Elk City.

Prospects for deep oil finds are by no means confined to the present producing fields of the basin. The trough of the Anadarko basin has several inviting prospects . . . Cheyenne, West Thomas, Arapaho, East Bessie, Cordell, and Fort Cobb. Very little is known of the structural position or lithological facies of the undrilled pre-Pennsylvanian formations in the basin's deep portions. What this area needs is 20,000-ft.-plus wildcats, and there will be some in the near future.

As a result of Union's McCormick discovery in Woodward County, look for accelerated Morrow prospecting along the shelf of the basin.



What happened

● Stimulated exploration d o w n d i p along the southwestward and coastward extension of Lower Cretaceous trend through Atascosa, McMullen, and LaSalle counties uncovered six more deep-Edwards fields during 1956.

They boost the total of such fields in these counties to 12. All have been productive of gas at depths ranging from 10,000 to below 14,400 ft. The first such discovery was at San Migual Creek late in 1953. Two discoveries (Stuart City and Washburn) were added in 1954, and three (Syndicate, Southeast Dilworth, and South Tilden) in 1955.

Discoveries in 1956 were by Stanolind Oil & Gas Co. at Cooke, Texas Eastern and Producers Oil Corp. at its Hayes wildcat, Standard Oil Co. of Texas at its Henry wildcat, Amerada Petroleum Corp. at Lowe Ranch, Lone Star Producing Co. at Fashing, and Lee Brothers at White Kitchen.

Lone Star, after a drill-stem test virtually confirming its 10,800-ft. Edwards discovery at Fashing, has deepened its second well to 13,961 ft., in the Sligo. At the year-end it was preparing to test some gas shows logged in a 11,300-ft. Glen Rose zone.

What it means

● Deep - Edwards discoveries in Atascosa, McMullen, and LaSalle counties during 1956 gave substantial additional evidence of extensive gas, condensate, and, possibly, oil reserves existing in the deeper, downdip phases of the Lower Cretaceous section along the southwestern extension of the Balcones fault trend, made famous by such shallower, updip prolific oil fields as Luling, Darst Creek, Salt Flat, and others.

They represent a major development in a relatively new realm of exploration into a sparsely exploited region of far-southwestern Texas.

Lone Star Producing Co.'s discovery northwest of Fashing and the old Fashing (Weigand) Carrizo field in southeastern Atascosa County, is at the farthest coastward location on that portion of the trend that Edwards has been found productive.

Deepest production, Edwards or otherwise, in South Texas is at Amerada's 1956 discovery at Lowe Ranch, in south-central LaSalle County. It is producing from its total depth of 14,479 ft.

New discoveries in the deeper downdip phases of the Edwards may serve to alter previous conceptions of the coastward extent of possible Lower Cretaceous exploration.

What's ahead

● Increasing importance is being attached to the Edwards and deeper Lower Cretaceous formations as objectives in extension of exploration and development of additional reserves southwestward and coastward from the Balcones fault trend in far-southwestern Texas.

Large productive potentialities already indicated by deep-Edwards discoveries in Atascosa, McMullen, and LaSalle counties, provide the incentive for further spread of exploration not only in these counties but in the still more virgin expanses farther southwestward.

In all except a few of the deep Edwards fields so far found, only their respective discovery wells have been completed. Development of these, not to mention many others certain to be uncovered, is certain to figure prominently in operations of the next few years.

To be watched in the immediate future is a deep Edwards test being started by Atlantic Refining Co. about 14 miles southwest of Tilden, in McMullen County. Location is about 1½ miles southwest of Amerada's 14,475-ft. Lowe Ranch Edwards discovery.

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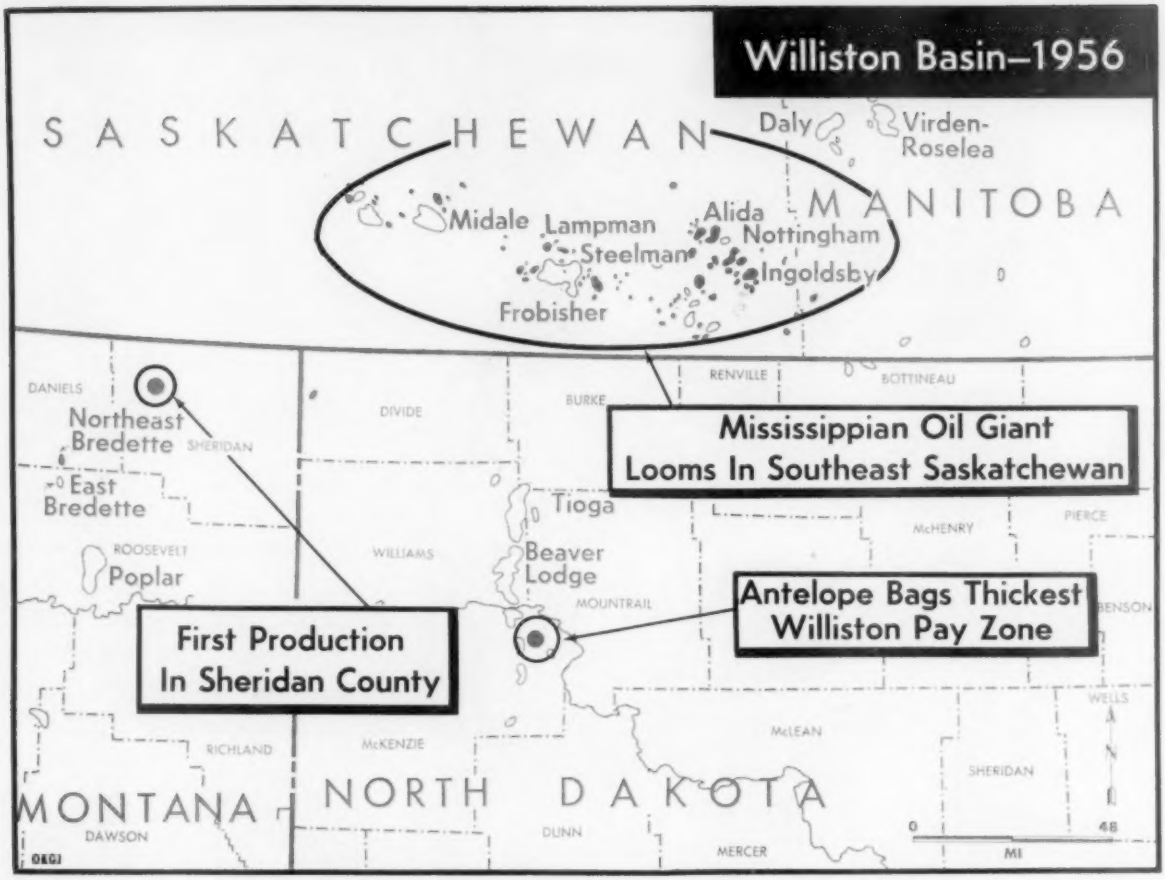


What happened

● Three areas dominated Williston basin exploratory and development activity ... . Southeast Saskatchewan, Antelope field in North Dakota, and Sheridan County, Montana.

... **Saskatchewan.** Exploratory and development drilling in this western Canada prairie province topped both Canadian and United States Williston activity. The fast-moving Mississippian play netted more than 700 oil wells. Quick, relatively shallow drilling and good weather piled up new discoveries and subsequent field wells at a fast rate to make the Saskatchewan play the most significant campaign since Beaver Lodge.

... **Antelope field.** Amerada opened this McKenzie County Madison-Mississippian field in May for 312 bbl. of oil daily at 8,500-8,700 ft. Drilling has already outlined over 1,200 acres that are productive.

... **Sheridan County.** Amerada opened this Montana county's first production at 1 Tange in the northeastern corner of the state. The well flowed oil from the Silurian at 9,050-9,230 ft. and tested oil in the Red River-Ordovician.

What it means

● Williston basin developments on both sides of the forty-ninth parallel emphasize that the region is one of the best undeveloped sedimentary units in North America in which to hunt for oil and gas. The year's happenings proved that the ripple of discouragement that filtered through the United States side of the basin early in the year was unfounded.

... **Mississippian goliath.** The mammoth Mission Canyon reservoir building up in Southeast Saskatchewan is a credit to Williston explorers. It has increased Canada's oil reserves, and has emphasized the need for closer examination of the basin's northeastern rim on both sides of the border.

... **The Madison.** Discovery of Madison oil is commonplace in the Williston basin . . . but fields with 300 ft. of gross pay section are unusual. This is Antelope.

... **Sheridan County's** first producer is important not only because of its position 29 miles from production, but also because of the reservoir age. The Silurian doesn't yet produce in North Dakota. The Tange well should stimulate a new Silurian search.

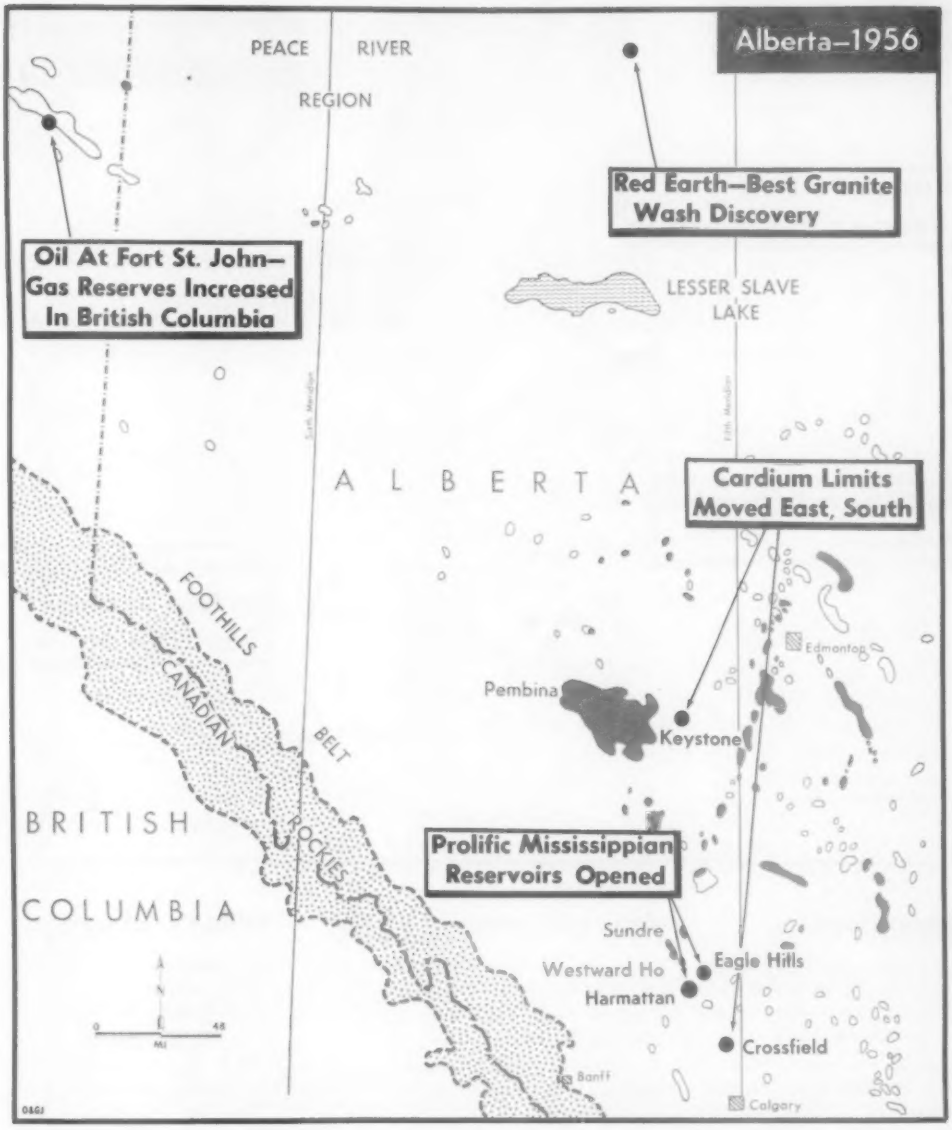
What's ahead

● Much additional oil will be found in the Williston basin as a result of the present steady development program and lessons learned in 6 years of drilling. The basin needs hundreds of wildcats to find this oil.

Southeast Saskatchewan, the second busiest area in western Canada, will become even more active in 1957. Lease expirations in many areas this year will force rapid development. Pipeline outlets are assuring crude output. Producing depths and drilling costs are reasonable. The Mississippian success in the southeast part of the province should spread southward and across the U. S. border in the coming months.

Amerada's Sheridan County discovery and a more recent one in Burke County, North Dakota, will add to the basin's wildcat attraction in the next year. The Silurian discovery in Montana will encourage some wildcat detective work aimed at that formation throughout the basin.

There is a definite trend toward new-pay exploration in the basin. Expect more deep tests on the Nesson anticline and in the Cedar Creek country.



What happened

● Western Canada's exploration highlights in 1956 were Red Earth, Harmattan, Eagle Hills, Keystone, Crossfield, and oil at Fort St. John.

... Red Earth. Union's Granite Wash oil discovery flowed 792 bbl. daily.

... Harmattan, Eagle Hills. Oilwell Operators-C.&E. 1-7 Harmattan flowed 4,200 bbl. per day during tests. Hudson's Bay 1 Eagle Hills, flowed oil from Mississippian at 732 bbl. per day.

... Keystone, Crossfield. Keystone was discovered in July by Cities Service. The follow-up well flowed 592 bbl. daily. Shell opened Cardium production at Crossfield in October.

... Fort St. John. Pacific et al. found oil at No. 45 well in the Permo-Penn and Triassic oil at two other wells.

What it means

... Red Earth. The Granite Wash oil discovery at Red Earth opened 40 million acres of untested muskeg country in northern Alberta and Saskatchewan. Five widespread Granite Wash strikes in the past 2 years in Alberta place this pay zone high on the hunting agenda.

... Harmattan, Eagle Hills. These two Mississippian hits further increased the tremendous potential of the prolific Sundre-Westward Ho region.

... The Cardium. The Keystone and Crossfield discoveries moved the Cardium porosity belt east and south.

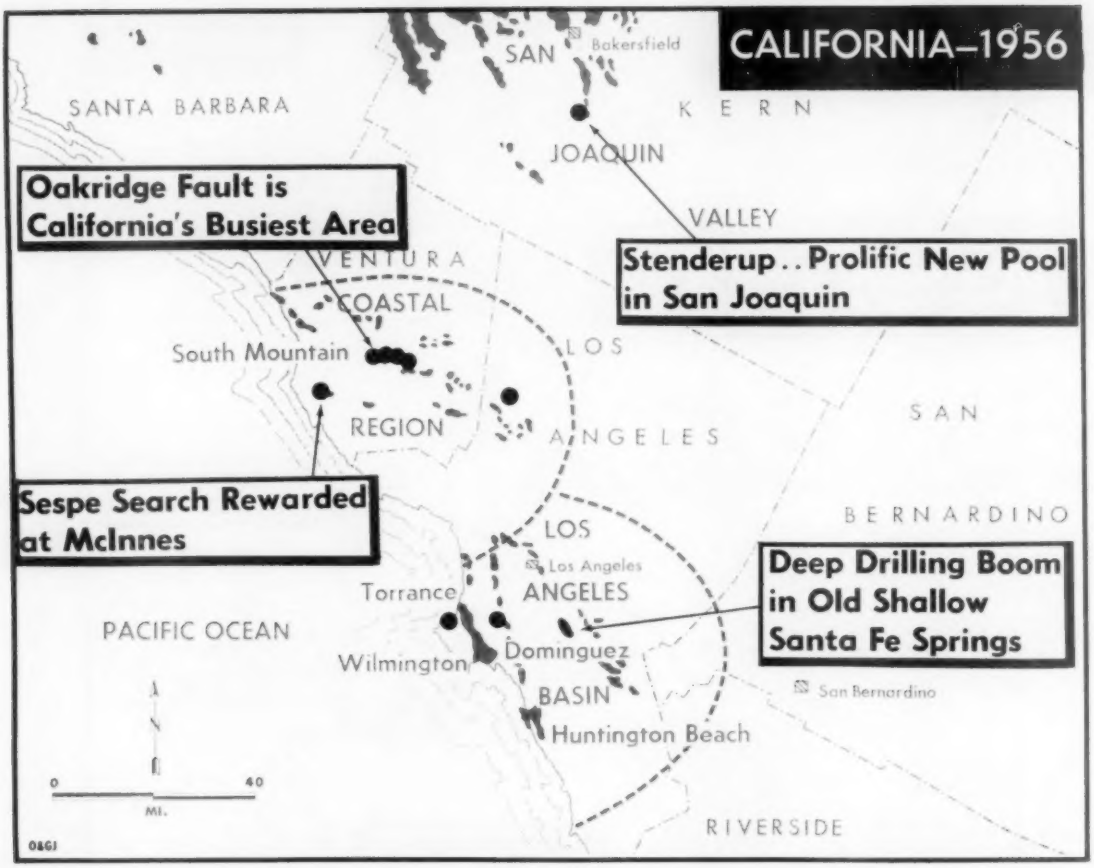
... Fort St. John. The discovery of oil at Boundary Lake in 1955 and at Fort St. John in 1956 tapped the province's unknown oil potential.

What's ahead

... For the Granite Wash. The Red Earth discovery is a sign of the times for western Canada exploration. The Prairie Provinces will see a period of real wildcatting in the immediate future. . . Look for a concentrated push into the vast northern hinterland.

... For the Cardium. In only 3 years the Cardium has emerged as Canada's greatest commercial reserve rock. The northwest, east, and southward push that began in 1956 in Alberta will continue. Look for new Cardium pools in unexpected places.

... For British Columbia. Oil optimism is unbounded here. Canada's big gas province may emerge as a new oil giant. Wildcats will pop up in all corners of the Fort St. John region.



What happened

● The West Coast's exploratory contributions for 1956 came from three sectors . . . San Joaquin Valley, Coastal region, and Los Angeles Basin.

. . . San Joaquin. Union Oil Co. of California 55-X Stenderup was completed flowing 1,440 bbl. of oil daily from the Derby sand at 9,535-9,717 ft. This was the best strike in some time for the valley. It is just west of Arvin in southern Kern County's Mountain View field area.

Another important coastal strike was Standard Oil Co. of California's McInnes pool, Oxnard field extension at 1 Diedrich. It flowed 467 bbl. daily from Sespe sands.

. . . Los Angeles Basin. General Petroleum Corp. 243 Santa Fe flowed 1,187 bbl. per day, opening a deep pool in Santa Fe field.

The Texas Co. and Superior Oil Co. completed five wells with more than 1,000 bbl. per day at Southeast area, Honor Rancho field, in the Tehachapi Mountains.

Union's Miocene 8 find in Dominguez field, Los Angeles County, made 797 bbl. of oil daily.

What it means

. . . San Joaquin. Union's discovery of Stenderup pool is important because it opens up an apparently prolific new pool for the valley.

. . . Coastal region. Recent success in Pliocene rocks associated with the Oakridge thrust fault in Ventura County points up this area as one of California's most prolific discovery areas in years.

. . . Oakridge fault. The new Pliocene pay at Saticoy, Bridge, Bardsdale, and Basolo are clues to a trend of pools extending the entire length of the Oakridge uplift string of anticlines. A unique feature here is that operators are finding Pliocene production below Oligocene, Miocene, and Eocene.

. . . McInnes. Standard's extension discovery gives operators further control in their search for Sespe oil in the Oxnard basin.

. . . The deep discovery in old Santa Fe Springs field exemplifies the new deep search that California operators are conducting. Results like these will accelerate ever deeper drilling in all old fields.

What's ahead

● California looks for increased exploratory activity in 1957 based on the developments of 1956.

. . . At Stenderup. Union apparently has a prolific discovery at Stenderup. No drilling boom is expected here because the company has a 4,500-acre block surrounding the discovery well which shuts out other operators.

. . . At Oakridge. There are 15 rigs drilling for Pliocene production under the Oakridge fault. A solid 12-mile-long field from Saticoy to Basolo is not seen, but rather a series of pools between them. Involved geological study will better unlock this highly faulted region.

. . . At McInnes. Continued search for Sespe production in the Oxnard basin is expected. The area is tricky, geologically, but reservoirs pay off well when found.

. . . Discoveries on the extreme west flank of Santa Fe Springs field may touch off a new drilling boom in this old area.

. . . Look for offshore drilling to really get under way in California in 1957.

two squeeze packers may

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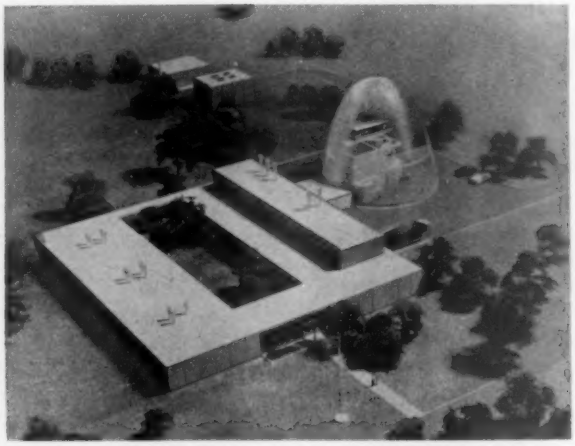
THE 5 ALBORZ, Iran's famous wildcat, blows in to spray 100,000 bbl. daily into the air, open up vast new reserves in interior.

OFFSHORE EXPLORATION saw many improvements come to drilling barges. This one is the stable, three-legged "Scorpion."

WORLD'S LARGEST fluid cat cracker went on stream for Tidewater, spotlighting twin capacity-quality buildup at refineries.



NUCLEAR RESEARCH made big strides in oil. Ten-company combine will build one in New Jersey, pattern it after this model.

A look behind—at one of

Here are headliners, as culled from the pages of the Journal.

IF the petroleum industry, which specializes in looking ahead, would pause for breath and take a look behind, it probably would surprise even itself with what it did in 1956.

Discoveries reversed themselves. After a disappointing 1955, they blossomed out again and a new cycle of oil finding appeared to be in the making.

Pipelines moved greater quantities over greater distances, refiners put record-size units and entire plants on stream with amazing regularity, and a king-sized boom was on for petrochemicals and L.P.G. Costs were ballooning. But so were earnings.

Wildcats were going deeper and tankers were growing from big to bigger, with plans flanged up for at least one oil-carrying vessel rated at 100,000 tons.

Longest pipeline . . . After 5 years and twice that many setbacks, the world's longest pipeline, the 2,250-mile Trans-Canada natural-gas line, finally got started.

Four important crude lines were talked or in the planning stage. One would span Europe from Marseille to Rotterdam and another would reach from Iraq's Kirkuk field, and possibly from farther south, through Turkey to the Mediterranean. The Philadelphia area was earmarked for a 500,000-bbl. daily line from a deep-water terminal in the Delaware Bay. The fourth was Israel's line from Elath to Haifa, designed to free Israel from the Suez Canal.

Biggest untapped area in the United States was introduced to natural gas by Pacific Northwest Pipeline Corp. Pacific Northwest then merged with another transmission giant, El Paso Natural Gas Co., resulting in a combined capacity of some 2½ billion cubic feet daily.

Company expansion . . . The trend to mergers, which ultimately wrote some of the year's biggest headlines, exhibited itself early, and as the trend built up, some charges of monopoly followed.

Superpremium 100-octane gasolines hit the market, ushering in a new three-grade system of selling it and the Wiese scale for measuring it. The rush for quality left some casualties among refiners who were too small to keep up. But it also brought a long list of new processes and techniques.

Automation Introduced

Automation made big strides. Crude was sold automatically at the lease for the first time and push-button refining

TRANS-CANADA, world's longest pipeline, crosses its first river. It got under way about midyear, after 5 years of trying.

LINES WERE BIGGER and longer in the U. S., too, as building continued fast. This is part of huge T.G.T. expansion.

HEAVYWEIGHT TANKER CROWN went to 84,730-ton Universe Leader. But plans were drawn for several in the 100,000-ton class.

GASOLINE MARKETING departed from traditional two-grade system. Sun Oil started it with five grades, blended at the pump.

petroleum's greatest years

was all but here. Drilling, too, came in for some improvements and the new Russian-designed turbodrill made its first test hole.

World's deepest wildcat came in at 21,465 ft. in Louisiana and answered some important questions about deep drilling.

Laboratories popped out like holly at Christmas time. There was a spurt in atomic studies as the industry went big league in its use of nuclear radiation for processing. Refiners got set for the coming of big jets to United States commercial airlines.

Labor strikes . . . Steel went on strike, idling scores of drilling rigs, knocking a big hole in exploration and construction programs, and pushing costs up sharply.

Foreign exploration got a big play. The big moves were in Venezuela, which opened concessions for the first time in 11 years and drew some staggering bonuses. And United States companies got a new competitor as Petrofina, fast-stepping Belgian giant, set up a subsidiary to operate here.

Offshore Drilling

New offshore equipment and techniques came thick and fast as operators expanded their activities, went farther and farther from shore to drill in deeper and deeper water. They were spending more, but they were finding more.

A lengthy squabble between the United States and Louisiana over boundaries in the tidelands hit hard, idled drilling rigs, and stopped new leasing. But the trouble was patched up with an interim agreement, pending a final decision from the U. S. Supreme Court.

Suez Canal . . . Another and bigger squabble, with repercussions reaching around the world, rocked the industry. Egypt nationalized the Suez Canal and a shooting war erupted as British and French troops invaded the Middle East country. The action put the canal out of service, disrupted pipeline operations, and cut off most of Europe's crude supply.

January

Fight over the Harris bill to free natural gas from federal controls opened in the Senate.

One of the biggest industry mergers in years was approved by Houston Oil Co. directors. The buyer: Atlantic Refining Co. The price: $224,654,265.

Spending for gas construction in 1956 is estimated at $1.2 billion, with pace to continue through 1958.

New high-compression cars put pressure on refiners to up octane still more. In some areas, octane ratings reported

too low to keep knock out of engines.

Pipeliners disclose plans for 18,000 miles of new pipe in '56.

Shale Oil Corp. of California announced plans to build a pilot plant to process oil from shale. Unit would use new Swedish Aspeco process.

February

Harris bill passes Senate, loosening federal reins on natural-gas industry. But the celebration was short-lived as presidential veto quickly tightens them up again.

Industry's first installation for automatic custody transfer of crude at the lease put into operation by Gulf Oil Corp. in Kansas, led off a trend which is replacing hand-gaging of oil.

Middle East reserves set at 260 billion barrels by Wallace Pratt—100 billion barrels higher than previous estimates.

Sun Oil Co. adds a new wrinkle to gasoline marketing with five grades, tailor made and blended at the pump.

Oklahoma gets a new production-depth record at prolific British-American strike bottomed at 15,310 ft.

South Central Saskatchewan gets its first production as the Williston basin is extended. Strike also gave the basin its first Bakken (Mississippian) pay.

First western Canada crude contracted for delivery into Michigan.

March

Powerforming, new catalytic reforming process, unveiled by Esso Standard. Jersey Standard affiliates plan to spend $60,000,000 on such units.

Santa Fe Springs field in California gets new life at 37. A new deep strike comes in for 1,776 bbl. daily.

Two giant plants announced for the growing petrochem skyline along the Gulf Coast.

Texas Gulf Producing joins the hunt for foreign oil, starting in Libya through its subsidiary, Libyan American Oil Co.

New heat-resistant mud, a calcium surfactant, goes to work in world's deepest well, drilling below 22,000 ft. Mud held up well in tests below 19,000 ft. where temperature reached 410° F.

Alberta throws open a vast new area in the vicinity of Red Earth field, where a prolific discovery launched one of the biggest land plays in the history of the province.

Natural gas builds up as a political issue in Canada. Big issue is all-Canadian pipeline vs. exchange arrangement involving United States interests. Meanwhile, Northern Natural Gas Co. of Omaha proposes a 1,215-mile big-inch line to move 300-million cubic feet of Alberta gas daily into the Midwest.

Phillips brings in gas-distillate discovery 40 miles off Louisiana in Eugene Island area. It's a record distance from shore.

A new record for tankers flying the United States flag was set with launching of S.S. Cities Service Baltimore, rated at 32,000 tons.

Industry's "best brains" give composite prediction of 4.4 per cent increase in domestic demand for '56.

Campaign for 20 per cent crude-price increase launched by TIPRO.

Bolivian Gulf Oil Co. formed to explore 3,750,000 acres held in Bolivia by parent Gulf Oil Corp.

April

Gulf buys $120,000,000 worth of 25-year subordinate convertible debentures from Union Oil Co. Gulf can ultimately convert them into 2,400,000 shares of Union's 7,331,790 shares outstanding.

Colorado Interstate seeks FPC permission to build big-inch line to move Rocky Mountain gas into the Midwest.

Esso Research & Engineering outgrows atomic sources for research; contracts to use nuclear reactor of Batelle Memorial Institute in expanded program.

Sun Oil expands its custom-blended five-grade system of marketing gasoline to take in entire State of Florida.

A revolutionary retractable drilling bit which can be changed without a round trip promises to cut drilling time in deep holes. Device is under wraps until licensed.

Experimental car with free-piston engine is built by General Motors. It burns anything from gasoline to Bunker C and even peanut oil.

Louisiana, United States clash as state accepts bids on offshore tracts claimed by Interior Department.

Australia's waning hopes for oil grow several kilowatts dimmer as deepest Wapet test ends up a duster.

Jersey Standard makes long-awaited move back into Cuba as it picks up exploration rights on 926,525 acres.

Heavy rigs move into West Pakistan to launch big oil hunt over 20,000 square miles where photographic surveys are described as "fantastically good." Companies are Hunt International and Standard-Vacuum.

Steel price hike of $10 or more a ton is predicted by The Oil and Gas Journal. They would follow new labor contracts in July.

Three important mergers highlighted activities this month. British American Oil Co., Ltd., bought out Canadian Gulf Oil Co. with 8,000,000 shares of stock in a complicated deal which means parent Gulf Oil Corp. will eventually control the Canadian firm.

W. R. Grace & Co., the international, multiple-interest giant, entered the oil business briefly by taking over Cosden Petroleum Corp. in a $55-million stock-exchange deal, which was later called off.

Belgian Petrofina entered the United States with a new subsidiary to purchase 600,000 shares of Panhandle Oil Corp. American Petrofina took an option on 270,000 additional shares, enough for control.

World's deepest well finally becomes world's deepest producer. After nearly 1½ years and a cost of $2½ million, 1-L Humble LL&E came in at 21,443-65 ft. for an initial flow of 500 bbl. daily.

Isomerate process bows in. It offers refiners a valuable tool for upgrading less desirable feed stocks into high-octane gasolines.

Navy runs into stiff congressional opposition on plans to drill on San Nicolas Island.

British Columbia scheduled for its first processing plant, an $18-million installation to handle Peace River gas.

Texas erases big discovery allowables for 1-mile stepouts, reserves bonuses for bona fide new-pool openers.

May

Traditional two-grade system for marketing gasoline may be on the way out. Esso Standard introduces a third grade superpremium to ease pressure of octane demand, which now ranges from the 80's up to 100-plus.

Upgrading of distress crude at the lease is revealed as a probability. A field unit using hydrodesulfurization would turn low-gravity sour crude into high-gravity sweet. Pilot-plant runs reported very favorable.

Colorado Oil & Gas gets permit to explore 1,250,000 acres along Alaska Gulf Coast.

India toughens oil policy, announces willingness to let private investors develop reserves, but state would take most of profits.

Tidewater Oil Co. underlines growing use of automation in refineries, announces its 130,000-bbl. Delaware City plant will be operated by a force of only 500.

Navy backs off from plans to condemn a huge block of promising offshore lands in face of strong Interior Department objections.

Giant computer system goes in at Esso Standard Oil Co.'s Baton Rouge refinery. It produces reports in minutes and hours that previously required days, weeks, and months.

Two-stage catalytic cracking makes

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debut at Shell's Anacortes, Wash., refinery.

Deal for Russian turbodrill is blocked as U. S. Commerce Department refuses to let Dresser Industries turn over certain industrial know-how to Soviets.

Problem of imports becomes thornier so importers get an ultimatum from Washington: Bring them back into line or face federal controls.

Venezuela's Barinas-Apure basin gets outlet to Caribbean.

Phillips takes one of biggest farmouts in Canadian history in deal with Southern Petroleums, Ltd., on 1,367,000 British Columbia acres.

Getty Oil Co. launches stepped-up drilling program in Kuwait-Saudi Arabia Neutral Zone. Aim: Triple production this year and exploit deeper pay zones.

First deep test ever drilled in Philippines yields show of oil at 9,026 ft. in Isabela Province.

W. R. Grace & Co. takes another step into oil, buys minority interest in Libyan American Oil Co.

June

World's deepest and highest-pressure underground gas-storage project is completed by Lone Star Gas. It converted multipay gas-distillate field in East Texas.

United States recoverable oil reserves reported at nearly 42 billion barrels by Interstate Oil Compact Commission.

Novel spraddle-legged platform spuds in wildcat off Louisiana in 112 ft. of water, deepest yet probed. C.A.T.C. group is operator.

Guatemala opens exploration to foreign operators with 673,000-acre concession in Peten to Signal Oil & Gas.

Multibillion-dollar highway bill passes both Houses of Congress. A 1-cent increase in gasoline taxes will pay most of the cost.

Trans-Canada gets past its biggest obstacle, wins parliamentary approval after bitter struggle.

Atlantic Refining completes its complicated deal to take over Houston Oil in one of biggest cash-payment deals in industry history—$73,500,000. Oil payments would bring total to nearly $200 million.

Jersey Standard invades rich Midwest market. It purchased Pate Oil Co. for $2 million, received 140 service stations in Milwaukee area.

Warm-water flood promises 74 million extra barrels of crude and 22 to 27 years more life for Canada's big Pembina field.

The 1,000,000th barrel of domestic catalytic reforming capacity is placed on stream making the catalytic reformer boom one of the miracles of the oil business.

U. S. Supreme Court defers decision on boundaries off Louisiana and issues injunction against new leasing and drilling. The way is left open for state and federal officials to reach an agreement permitting resumption of activities, pending a final ruling.

Dresser Industries signs contract to manufacture French version of the turbodrill.

Another big merger wins a surprise approval as The Texas Co. is given official nod on plans to buy Trinidad Oil Co. British parliament approved after a storm of protests almost wrecked the deal. But the storm subsided as money-short Britons took another look at the offer—$176,400,000 in cash.

Three-grade system of marketing gasoline widens as Esso Standard prepares to install third-grade superpremium throughout its marketing area.

American Chemical Society moves to sell Universal Oil Products as trustee seeks to diversify portfolio.

Venezuela finally grants long-talked-of concessions, the first in 11 years. Eight highly prized leases bring record $190-million offer from flock of American firms.

First tailor-made chromatograph for automatic analysis of refinery gases goes into operation.

July

First scatter microwave system for commercial use by private firm is scheduled by South American oil company.

The steel strike hit the industry like a bomb. Visible effects were slight at first, but timetables were soon tripped over on $850 million worth of refinery construction.

Rexforming becomes a reality. First unit using the quality-building process went into operation at Aurora Gasoline Co.'s Detroit plant. Half a dozen others are building or planned.

The Wiese scale was officially adopted by the industry for measuring octanes above 100, where old scale stops.

Inferior-use controls of natural gas may be at an end. FPC reverses its earlier decision and approves sale of natural gas as a boiler fuel.

Oklahoma sets a precedent by ordering all crude purchasers to take all oil offered up to lease allowables.

Trans-Europe pipeline proposed to move Middle East crude from Marseille to Rotterdam. It would cut tanker hauls and permit refineries to locate near market centers.

L.P.G. underground storage facilities reached 22.2 million barrels, a 40 per cent increase in 1 year, and the boom will continue for several years.

A new petrochem center appears in the making at Sarnia, Ont. Imperial Oil, Ltd., will build a $25,000,000 plant to produce a wide range of basic petrochemicals; make nearby plant sites available to firms who would use the products.

As producers thumped the tub harder than ever for a price hike, West-Central Texas counties were handed a cut. It was a small one—7 cents a barrel—and it covered only sweet crude. But it spread to other areas. Behind it: A move to pay prices which reflect refining value instead of gravity.

Microwave goes offshore. Magnolia setting up communications link to coordinate production and pipeline operations in the gulf. It's an industry first.

Report on crude imports show they set another all-time high in May, the fifth record in 12 months. Importers say they plan substantial cutbacks.

The mergers go on. Sinclair will pay $107½ million for Southern Production Co.

New wrinkle is added to superpremium-gasolines trend, which brought on third-grade system. Shell introduces 100 octane, but it's not a third grade. It will replace company's premium.

British-American Oil Producing Co. opens Hainesville salt-dome production at what might be East Texas' most important strike in recent years, touches off big land play.

C.A.T.C. Offshore Group celebrates its tenth birthday. With a hot discovery average of better than two strikes out of three tries, it describes offshore operations as "risky but promising."

August

Oil management got its first hint of labor's long-range plans for a short work week with no cut in take-home pay. Resolution calls for 36 hours.

Egypt nationalizes Suez Canal, throws scare in Middle East operators and the world in general.

Steel strike was short, but effects were long. Toll so far: 200 idle rigs, 2,000 wells lopped off last-half exploration plans, and jump of $8.50 a ton in basic costs. Cost of finished oil-country products went up almost twice that, however, pushing industry's inflated bill to an estimated $75 million a year. Steel shortage to continue through foreseeable future.

Jersey Standard makes second move into Midwest market with merger of South Side Petroleum Co. and Oklahoma Oil Products, both with service-station chains in Chicago area.

Precedent in fixing allowables set in Colorado's Adena field. For the first time anywhere, they were based on oil in place under individual leases.

Indiana Standard joins parade of

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companies going abroad with a new subsidiary to seek concessions in Venezuela.

Growing emphasis on atomic processing spotlighted by miniature atomic refinery built in Philadelphia by Atlantic Refining to study effects of radiation on petroleum conversion.

Proposed sale of Universal Oil Products draws fire from independent refiners who claim they could not stay in business without U.O.P.'s technological aid.

First natural gas flows into Pacific Northwest in substantial quantities through Pacific Northwest Pipeline's crude outlet from San Juan basin. It taps one of the last big areas natural gas had not been serving.

First complete picture of imports comes into focus. Reports to Texas Railroad Commission show a 17 to 20 per cent increase over '55 purchases scheduled to come into country.

Venezuela counts its take from first concessions in 11 years. It comes to a healthy $360 million and some valuable fringe benefits.

September

Iran gets a famous blowout. Wild well gushes estimated 100,000 bbl. or more daily. It's 200 miles from nearest production and promises a vast new reservoir in Iran's interior. It was finally capped after losing estimated 2,000,000 bbl. in 456 hours.

O.C.A.W. sharpens its sights, endorses 30-hour week with no cut in take-home pay instead of previously proposed 36 hours. Drive will open at 1957 contract talks.

Costa Rica strike gives first production to Central America. Union Oil Co. brought it in after four failures.

Russian turbodrill will come to United States after all. Dresser Industries will pay for it in cash to get around Interior Department objections to handing out drilling data previously agreed on.

First communications system in petroleum industry using tropospheric scatter propagation will be installed in Venezuela by Shell.

Hydrogen treating bids to become workhorse of refining industry. A sensational new use just announced: Mild hydrogenation of asphalt providing a yield of gasoline, heating oil, gas oil for catalytic cracker, and residual fuel oil.

Independent refiners win fight to be heard in court on proposed sale of Universal Oil Products.

Research gets hotter. The first fissionable material for private industry is released to Magnolia for use at its Dallas research center. Company was granted 16 g. of plutonium-berylium. New atomic laboratory will be built in Oklahoma by Continental Oil Co.

Free World crude production passes 15-million-barrel mark for first time, reflecting record output of Middle East and Venezuela. Imports topped a million barrels for first time.

Chinese engineer comes up with radical process for preparing catalytic cracker feed stock. The process uses BF_3-ether reagent to remove coke reformers from crude.

October

Automatic custody transfer moving out of testing stage. Phillips plans 25 batteries in '57.

Drilling resumes in disputed tidelands as result of interim agreement reached between United States and Louisiana officials, but final settlement far from complete.

A new bidder throws hat in ring for Trinidad Petroleum Development Co. British Petroleum Co., Ltd., offers $26.8 million. Move will probably shove Colorado Oil & Gas, already negotiating for the company, out of the picture.

Mexican gas will come to the United States. Texas Eastern Transmission Corp. will build an $82.7 million pipeline to move it. Project later to expand into $147 million operation.

Invasion of Egypt, closing of canal rock the industry. British-French military action cuts Middle East crude exports to trickle. Shortage hits all Europe. Pipelines from Mid East disrupted by sabotage.

November

Shock waves from the Middle East travel quickly around the world. Britain and France hunt for over 2 million barrels of oil daily, aim sharp criticisms at United States for not getting plan into motion for supplying it. Tanker shortages and tight crude markets loom for the United States. First trickle of crude starts for Europe.

New world-champion mover of natural gas looms in merger of El Paso Natural Gas Co. and Pacific Northwest Pipeline Corp. In stock-exchange deal, El Paso to pay $140,000,000. Consolidation gives El Paso total capacity of about 2½ billion cubic feet daily. This will jump to over 3 billion when new projects now building or planned are completed.

The Sahara Desert promises to get hot in a new kind of way. French claim a strike in Algeria found 60 ft. of pay and reserves of 7,000,000,000 bbl.

Pattern for leasing in California's tidelands is revealed. It's a checkerboard, designed to give the state a stake in any offshore production.

California producers get a crude-price hike. Union Oil kicked it off, adding as much as 40 cents a barrel to the price of low-gravity crude.

December

Trickle of crude to Europe becomes a flood and the continent's shortage was quickly being alleviated. Side effect of Middle East crisis: Postponement of action on imports question, which was fast coming to a head in the United States. But predictions came from Washington that a new deal would emerge from the shambles. It would erase all exceptions on imports except those from Canada.

The shooting war in the Middle East came to an end soon after it started. But the Suez Canal was blocked by scuttled ships. Conservative estimates had the clearing job taking at least 6 months.

A sign of the times was seen in Tidewater Oil Co.'s new coker, which went on stream at firm's Avon, Calif., plant. The fluid unit is the world's largest, with capacity of 42,000 bbl. Tidewater also was putting in five record-breaking units at its big Delaware City plant.

With the growth in mergers came a growing cry of monopoly. California official asks for investigation of deal which merged El Paso Natural and Pacific Northwest. Antitrust charges levelled at merger of Gulf and Warren Petroleum. Hearing set for early '57.

Bizarre map theft hits Gulf Oil Corp. Potential value of stolen maps listed in millions of dollars.

A 500,000-bbl.-daily crude line to serve the Philadelphia refining area is announced.

A 50,000-bbl.-daily crude line from the Four Corners area to Texas is announced. It leaves plans for a line to the West Coast up in the air just as this on-again off-again project seemed to be jelling.

Automatic refinery operations moved a big step closer as Esso Standard integrates computer directly into fluid catalytic cracker. Device will result in push-button control of the operation.

L.P.G. ends year with record production, more storage space, and greater stability than ever before.

Quick tax writeoffs for steel received a thumbs-down sign from Washington, throwing a kink in plans for big expansion program. In a related decision, tanker builders were denied a special allocation of plate.

Major breakthrough in aromatics promised by totally new approach in liquid-phase oxidation.

IN WASHINGTON—

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INTERIOR DEPARTMENT

Secretary—Fred A. Seaton, 6151 Interior Department Building.

Asst. Sec. for Mineral Resources—Felix E. Wormser, Room 6654.
Charged with over-all supervision of oil and gas activities.

Office of Oil and Gas—Hugh A. Stewart, director, Room 5512.
Serves all government agencies in an informational and advisory capacity, cooperating in the handling of broad national and international oil problems, and is the foundation on which a wartime oil agency would be set up.

Bureau of Mines

Director—Marling J. Ankeny, Room 1614

Chief of Petroleum and Natural Gas Branch—Roscoe A. Cattell, Room 4410.
Studies problems involved in the production of oil, conducts research in synthetic liquid fuels and gasification of coal; operates plants for the production of helium; issues forecasts of oil demand, statistics on production, and reports on field and experiment station investigations.

Geological Survey

Director—Thomas B. Nolan, Room 5243 General Services Building.
Classifies public lands as to their mineral character and supervises drilling operations on leased lands, including the outer Continental Shelf; produces topographic and geologic maps and conducts research in geological and related chemical and physical problems.

Bureau of Land Management

Director—Edward Woozley, Room 5660.
Responsible for the management, protection, and disposal of natural resources of public lands; handles the leasing of public lands, including the outer Continental Shelf, for oil, gas and mineral development.

Bureau of Indian Affairs

Commissioner—Glenn L. Emmons, Room 4160.
Acts as trustee for the Indians, supervising the leasing of Indian lands for oil and other development.

Office of Territories

Director—Anthony T. Lausi, Room 6514.
Promotes the economic development of Alaska and other territories.

Fish and Wildlife Service

Director—John L. Farley, Room 3156.
Charged with the protection of wildlife refuges and regulation of oil and other development in wildlife areas.

DEPARTMENT OF DEFENSE

Secretary—Charles E. Wilson, 3E880 Pentagon, Arlington, Va.

Asst. Sec. for Research and Development—C. C. Furnas, 3E1074 Pentagon.
Charged with coordination of military research and development programs, including fuels and lubricants.

Petroleum Logistics Division—Maj. Gen. L. E. Cotulla, staff director, 2C833 Pentagon.
Development of military aspects of petroleum security plans, advising the military on petroleum policy and coordinating military actions affecting petroleum.

Military Petroleum Supply Agency—Rear Adm. O. P. Lattu, director, 1B7 Yards and Docks Building, Arlington, Va.
Coordinates purchase, storage, and distribution for all military services and joint technical agency dealing with short-term petroleum problems including military emergency, mobilization, and war plans.

Army Department

Quartermaster General—Maj. Gen. K. L. Hastings, Tempo B, Second and T Streets, N. W.
Determines requirements and distributes principal products used by ground forces.

Corps of Engineers—Maj. Gen E. C. Itschner, chief, Tempo 7, Gravelly Point.
Development and procurement of handling equipment of fixed or semifixed nature, such as military pipelines.

Ordnance Department—Lt. Gen. E. L. Cummings, chief, 2E400 Pentagon.
Activities relating to motor vehicles for ground forces, including fuels and lubricants.

Chemical Warfare Service—Maj. Gen. W. M. Creasy, chief, Tempo 7, Gravelly Point.
In charge of chemical-warfare activities and manufacture of chemical-warfare materials from petroleum.

Navy Department

Bureau of Aeronautics—Rear Adm. James S. Russell, chief, 2085 Navy Building, Constitution Avenue at Seventeenth Street, N. W.
Design, development, procurement, and research on naval aircraft, including fuels and lubricants.

Bureau of Ordnance—Rear Adm. Frederick S. Withington, chief, 0031 Navy Building.

Bureau of Ships—Rear Adm. Albert G. Mumma, chief, 3046 Navy Building.
Design, construction, and operational supplies for naval vessels, including fuels and lubricants.

Bureau of Supplies and Accounts—Rear Adm. R. G. Arnold, chief, 0026 Navy Building.
Buys, receives, and warehouses naval fuel supplies.

Bureau of Yards and Docks—Rear Adm. R. H. Meade, chief, 2859 Yards and Docks Building, Arlington, Va.

Office of Naval Research—R. A. Bennett, director, 1804 Tempo 3, Constitution Avenue and Seventeenth Street, N. W.

Office of Naval Petroleum Reserves—Capt. A. S. Miller, director, 2B4 Yards and Docks Building.
Administration and development of naval oil and shale reserves.

Military Sea Transport Service—Vice Adm. John M. Will, chief, Tempo 8, Wisconsin Avenue and Porter Street, N. W.
Handles ocean transportation of oil and other cargo for the military services, including the chartering of tankers.

DEPARTMENT OF COMMERCE

Secretary—Sinclair Weeks, 5854 Commerce Department Building.

Bureau of Standards

Director—Dr. Allen V. Astin, 314 Bureau of Standards.
Makes investigations on petroleum and products and conducts research on performance of internal-combustion engines and fuels and lubricants.

Bureau of Public Roads

Commissioner—C. D. Curtiss, 6004 General Services Administration Building.
Compiles information on number of vehicles in operation, mileage traveled, etc., as guide to planning national highway program.

Patent Office

Commissioner—Robert C. Watson, 1067 Commerce Department Building.
Passes on applications and issues patents, copyright, and trade mark registrations.

Census Bureau

Director—Dr. Robert W. Burgess, 2104 Federal Office Building, Suitland, Md.
Collects statistics relating to the oil and other industries, and maintains records on exports and imports.

Business and Defense Service Administration

Administrator—Harold B. McCoy, 4848 Commerce Department Building.
Charged with current mobilization activities assigned to department, including transportation; allocation of controlled materials used by the oil and gas industries.

Maritime Administration

Administrator—Clarence G. Morse, 3055 General Accounting Office Building.

Coast and Geodetic Survey

Administrator—Adm. H. Arnold Garo, 2800 Commerce Department Building.
Makes coastal surveys and furnishes information valuable in offshore oil and gas exploration.

Civil Aeronautics Administration

Administrator—James T. Pyle, 1510 Tempo 4, Constitution Avenue at 17th Street.
Undertakes and supervises development in field of aeronautics, including research in petroleum used by aircraft.

Bureau of Foreign Commerce

Director—Loring K. Macy, 3733 Commerce Department Building.

★ WASHINGTON OIL DIRECTORY

Administers export control laws which cover export of petroleum and petroleum products, equipment and technical information relating to oil and gas.

DEPARTMENT OF STATE

Secretary—John Foster Dulles, fifth floor, State Department Building.

Director of oil division—Edwin G. Moline, Room 7222.

Compiles information and data on oil industry, world-wide, and advises on international oil matters.

TREASURY DEPARTMENT

Secretary—George M. Humphrey, 3330 Treasury Department Building.

Bureau of Customs

Commissioner—Ralph Kelly, 7026 Internal Revenue Building.

Responsible for administration of customs laws and regulations.

Internal Revenue Service

Commissioner—Russell C. Harrington, 3006 Internal Revenue Building.

Charged with collection of federal taxes and issuance of regulations on depletion and other questions involving taxation of oil and gas industries.

Coast Guard

Commandant—Vice Adm. Alfred C. Richmond, 7006 Coast Guard Building.

Administers navigation regulations as applicable to operations in the outer Continental Shelf; assists Corps of Engineers in enforcement of the Oil Pollution Act.

Federal Facilities Corp.

Administrator—Asst. Sec. Lawrence B. Robbins, 1211 LaFayette Building.

Charged with disposal of the alcohol-butadient plant at Louisville and certain other surplus federal properties.

DEPARTMENT OF JUSTICE

Attorney General—Herbert Brownell, Jr., 5109 Justice Department Building.

Asst. Atty. Gen., Lands Division—Perry Morton, Room 2143.

Charged with enforcement of laws relating to federal lands, passing on legality of leases for private development of naval petroleum reserves, etc.

Asst. Atty. Gen., Antitrust Division—Victor Hansen, Room 3107.

Prosecutes government cases involving monopoly and violation of the antitrust laws, determination of boundaries of coastal states, etc.; passes on legality of activities under the voluntary agreements on tankers and foreign supply; investigates and reports periodically on antitrust aspects of activities under the Interstate Oil Compact.

DEPARTMENT OF LABOR

Secretary—James P. Mitchell, 3136 Labor Department Building.

Asst. Sec. for Manpower and Employment—Mrs. Aryness J. Wickens, Room 3214.

Bureau of Labor Statistics

Commissioner—Ewen Clague, Room 2307.

Collects and distributes basic information on hours, wages, etc., in the oil and other industries.

Federal Mediation and Conciliation Service

Director—Joseph Finnegan, Room 3412.

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Secretary—Marion B. Folsom, 5246 HEW Building.

Public Health Service

Surgeon General—Dr. Leroy E. Burney, 5069 HEW Building.

Issues regulations requiring that certain precautions be taken with regard to petroleum products to protect public health; has enforcement of the Water Pollution Control Act requiring oil operators, refiners, and manufacturers to clean up waste discharged into interstate waters.

DEPARTMENT OF AGRICULTURE

Secretary—Ezra Taft Benson, 200-A Agriculture Department Building.

Forest Service

Recreation and Lands Division, chief—John Sieker, Room 3217 South Building.

Handles mineral leasing of lands under jurisdiction of the department.

Agricultural Research Service

Crop Research Division, Asst. Director—Dr. Herbert L. Haller, 320 Administration Building.

OFFICE OF DEFENSE MOBILIZATION

Director—Arthur S. Flemming, 102 Executive Office Building.

Has over-all responsibility for the mobilization program, including accelerated tax amortization and defense loans for expansion of industry; advises National Security Council and Defense Mobilization Board on policy matters, including those involving oil and gas; responsible under Trade Agreements Act for advising President if imports of foreign oil threaten national security.

FEDERAL POWER COMMISSION

Chairman—Jerome K. Kuykendall, 2047 General Accounting Office Building.

General Counsel—Willard Gatchell, Room 2095-A.

Regulates construction, rates, and practices of interstate natural-gas pipelines, issues certificates for sale of gas by independent producers and passes on prices.

FEDERAL TRADE COMMISSION

Chairman—John W. Gwynne, 540 Federal Trade Commission Building.

Director, Bureau of Investigations—Harry A. Babcock, Room 470.

Director, Bureau of Litigation—Joseph E. Sheehy, Room 394.

Director, Bureau of Economics—Simon Whitney, Room 232.

Administers Federal Trade Commission, Clayton and Robinson-Patman acts barring deceptive and unfair methods of competition, price-fixing agreements in restraint of trade, unlawful price discriminations, and mergers tending to promote monopoly.

UNITED STATES TARIFF COMMISSION

Chairman—Edgar B. Brossard, 208 Tariff Commission Building.

Advises President of extent to which import duties may be cut in reciprocal trade agreements without serious injury to domestic industry, and recommends action to be taken to protect industry under escape clause and relief provisions of trade agreements.

SMALL BUSINESS ADMINISTRATION

Administrator—Wendell B. Barnes, 443 La-Fayette Building.

FEDERAL COMMUNICATIONS COMMISSION

Chairman—George C. McConnaughey, 6107 New Post Office Building.

General Counsel—Warren E. Baker, Room 7334.

Controls radio facilities used by the oil and gas industry.

INTERSTATE COMMERCE COMMISSION

Chairman—Owen Clarke, 5124 Interstate Commerce Commission Building.

Director, Bureau of Rates, Tariffs and Informal Cases—Edward Cox, Room 4318.

Director, Division of Accounts, Cost Finding and Evaluation—Cecil Emken, Room 5115.

Commissioner in Charge, Defense Mobilization Staff—Owen Clarke, Room 3229.

SECURITIES AND EXCHANGE COMMISSION

Chairman—J. Sinclair Armstrong, 269 425 Second Street, N. W.

Oil and Gas Unit—Tell T. White, Room 363.

GENERAL SERVICE ADMINISTRATION

Administrator—Franklin G. Floete, 6137 General Services Administration Building.

Determines supply requirements, establishes specifications and buys petroleum and gas used by most federal civilian agencies.

RENEGOTIATION BOARD

Acting Chairman—Thomas Coggeshall, 1027 Tempo S, Seventh Street and Jefferson Drive, S. W.

Administers Renegotiation Act, including renegotiation of petroleum and gas contracts with federal agencies.

NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

Director—Dr. Hugh L. Dryden, 904 1512 H Street, N. W.

Carries on scientific studies of problems of flight, including petroleum materials; conducts research on aircraft propulsion fuels and lubricants.

ATOMIC ENERGY COMMISSION

Chairman—Lewis L. Strauss, 1901 Constitution Avenue, N. W.

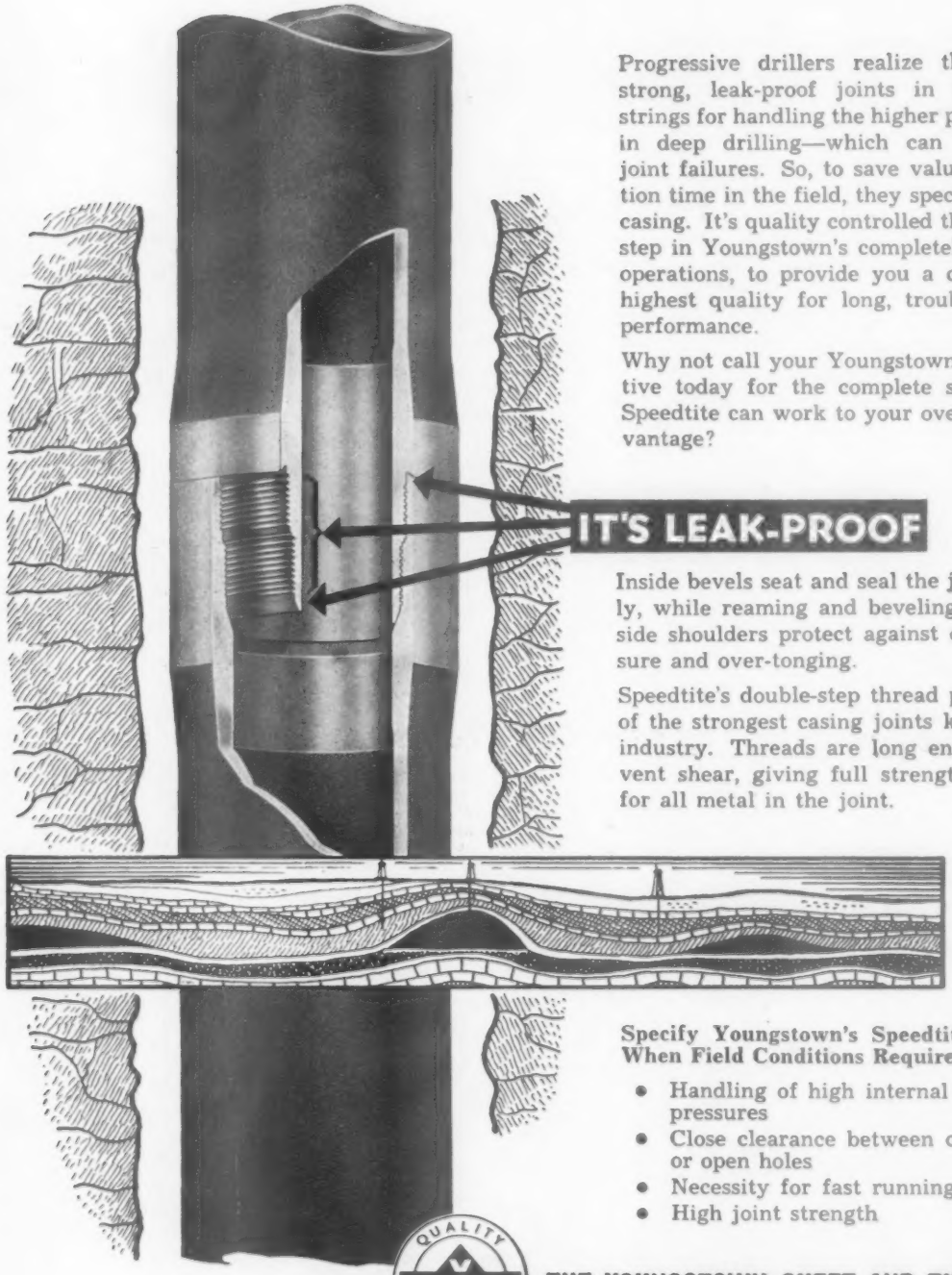
Controls use of nuclear and radioactive materials used by the oil and other industries.

CIVIL DEFENSE ADMINISTRATION

Administrator—Val Peterson, 3344 General Services Administration Building.

Makes plans for petroleum and other vital supplies in event of enemy attack and for emergency rehabilitation of petroleum and other industrial facilities.

LEAK-PROOF SPEEDTITE® CASING GUARDS AGAINST COSTLY JOINT FAILURES



Progressive drillers realize the value of strong, leak-proof joints in their casing strings for handling the higher pressures met in deep drilling—which can often cause joint failures. So, to save valuable production time in the field, they specify Speedtite casing. It's quality controlled through every step in Youngstown's completely integrated operations, to provide you a casing of the highest quality for long, trouble-free field performance.

Why not call your Youngstown Representative today for the complete story of how Speedtite can work to your over-all cost advantage?

IT'S LEAK-PROOF

Inside bevels seat and seal the joint perfectly, while reaming and beveling of the outside shoulders protect against outside pressure and over-tonging.

Speedtite's double-step thread produces one of the strongest casing joints known to the industry. Threads are long enough to prevent shear, giving full strength in tension for all metal in the joint.

Specify Youngstown's Speedtite Casing When Field Conditions Require—

- Handling of high internal fluid pressures
- Close clearance between casing strings or open holes
- Necessity for fast running speeds
- High joint strength

QUALITY YOUNGSTOWN SERVICE

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steel

General Offices - Youngstown 1, Ohio
District Sales Offices in Principal Cities

Postwar record of footage and number

. . . Total footage, up from 97 million to 234 million

(Thousands of feet)

	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956
Arkansas	728	1,409	1,270	1,283	1,342	1,522	1,589	2,111	2,400	2,629	3,005
California	7,509	8,764	10,579	10,443	7,966	9,566	10,313	11,355	10,923	12,724	10,566
Colorado	1,063	1,151	1,228	359	409	1,425	2,580	3,830	7,412	8,103	6,232
Illinois	5,925	5,251	6,386	6,362	6,311	6,044	5,312	5,425	7,613	9,303	8,771
Indiana	1,071	1,206	2,023	2,357	2,642	2,455	2,255	2,102	1,380	1,103	1,243
Kansas	6,556	8,690	10,634	10,715	12,744	15,035	15,520	16,217	16,328	17,597	17,103
Kentucky	1,175	1,194	1,515	1,853	2,076	2,412	2,568	2,355	2,284	2,372	2,748
Louisiana	8,464	8,709	10,934	12,477	14,554	14,189	15,662	19,125	21,987	26,085	28,438
Northern	3,175	2,912	4,128	4,453	4,626	4,741	4,815	4,530	5,923	6,460	6,083
Southern	5,289	5,797	6,806	8,024	9,928	9,448	10,847	14,595	16,064	19,625	22,355
Michigan	1,749	1,935	1,983	2,209	2,118	1,860	1,808	1,603	1,542	1,522	1,262
Mississippi	1,971	4,131	3,312	2,388	2,258	2,539	2,441	2,750	3,162	3,339	3,193
Montana	661	630	819	650	621	640	1,257	1,933	1,473	1,928	2,440
New Mexico	1,624	2,512	2,602	2,419	2,747	3,777	5,833	8,017	6,161	7,046	8,458
N. Y., Pa., and W. Va.	9,985	9,702	9,293	5,835	5,381	5,800	6,512	5,662	6,691	3,993	4,439
North Dakota				24	27	65	1,002	1,962	2,246	1,774	1,977
Ohio	3,402	3,913	3,498	2,286	2,172	2,057	2,295	2,274	2,391	2,642	2,583
Oklahoma	9,771	12,151	15,515	15,339	19,865	20,542	21,621	26,122	29,463	27,532	27,821
Texas	34,352	41,029	52,746	57,462	71,975	76,777	82,451	78,645	85,185	85,984	92,620
North Central (7-B & 9)	7,065	8,544	11,312	12,831	14,513	16,017	18,688	21,958	22,484	22,982	23,396
West (7-C & 8)	8,815	10,809	15,428	16,398	26,543	28,233	29,389	20,318	25,144	26,560	28,664
Panhandle (10)	943	1,593	2,053	3,015	2,804	2,307	2,123	2,555	3,211	3,720	5,202
Eastern (5 & 6)	3,792	3,070	3,383	4,992	4,928	5,603	4,455	4,209	5,590	4,884	5,682
Gulf Coast (2 & 3)	11,599	9,559	11,995	11,880	13,706	14,328	16,968	16,361	17,245	16,034	17,452
Southwest (1 & 4)	2,138	7,454	8,575	8,346	9,481	10,289	10,828	13,244	11,511	11,804	12,226
South Dakota	16	8	4	11	30	3	48	103	108	64	48
Wyoming	716	1,203	2,501	2,803	2,994	3,789	3,529	4,337	6,537	4,484	3,966
Miscellaneous	318	473	550	728	1,056	1,834	2,594	2,911	3,700	6,046	6,989
Total United States	**97,056**	**114,061**	**137,392**	**138,003**	**159,288**	**172,331**	**187,190**	**198,839**	**218,986**	**226,270**	**233,902**

. . . Total completions, up from 29,228 to 58,160

	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956
Alabama	16	29	21	19	43	50	72	103	63	41	91
Arkansas	183	329	301	322	407	429	427	573	665	804	1,002
California	1,790	2,053	2,876	2,512	1,829	2,361	2,433	2,578	2,353	2,465	2,306
Colorado	167	209	207	82	99	289	486	734	1,358	1,509	1,222
Florida	28	35	26	24	13	2	10	30	31	30	13
Illinois	2,343	2,033	2,438	2,711	2,823	2,424	2,149	2,165	3,135	3,892	3,808
Indiana	582	681	1,082	1,279	1,534	1,369	1,277	1,280	887	706	741
Kansas	2,027	2,694	3,284	3,387	4,010	4,501	4,571	4,783	4,722	4,958	4,941
Kentucky	714	660	908	1,047	1,150	1,309	1,300	1,164	1,188	1,592	1,936
Louisiana	1,384	1,626	2,325	2,371	2,453	2,240	2,385	2,828	3,611	4,019	3,875
Michigan	788	909	895	995	897	746	707	623	567	512	437
Mississippi	260	491	428	334	313	375	348	397	441	448	441
Missouri	0	0	0	0	27	18	18	10	39	1	34
Montana	313	309	345	279	270	262	345	451	343	411	495
Nebraska	18	7	62	49	171	241	291	320	472	891	918
New Mexico	411	562	606	501	607	773	1,053	1,418	1,126	1,663	1,904
New York	1,544	1,531	1,344	882	657	627	767	696	435	378	512
North Dakota	0	0	0	0	3	13	122	270	312	250	263
Ohio	1,275	1,377	1,393	1,084	1,027	971	1,052	1,080	1,182	1,259	1,086
Oklahoma	3,050	3,846	4,293	4,352	5,459	5,626	5,781	7,593	8,786	8,411	8,056
Pennsylvania	3,584	3,238	3,159	1,920	1,581	1,738	1,884	1,507	1,331	717	748
South Dakota	9	3	0	0	12	0	14	20	23	16	9
Texas	7,804	9,301	12,251	13,665	16,585	16,655	16,845	17,019	18,865	19,981	21,519
Utah	4	4	18	49	17	39	79	70	91	92	141
West Virginia	755	882	846	518	652	622	606	618	614	640	693
Wyoming	168	267	584	587	615	745	700	917	1,221	915	930
Miscellaneous	11	46	86	69	25	91	99	32	69	81	39
Total United States	**29,228**	**33,122**	**39,778**	**39,038**	**43,279**	**44,516**	**45,821**	**49,279**	**53,930**	**56,682**	**58,160**

# of wells completed in the United States

Wildcat completions, up from 4,518 to 13,034

	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956
Alabama	11	23	19	14	20	21	40	75	56	40	30
Arkansas	50	65	97	78	100	99	97	140	157	210	190
California	260	359	492	487	450	551	597	666	572	530	527
Colorado	21	51	46	48	56	143	245	364	657	811	675
Florida	26	27	23	19	10	2	10	30	30	29	13
Illinois	635	521	622	724	810	873	656	425	461	635	772
Indiana	118	156	327	471	570	559	424	373	224	261	145
Kansas	307	412	510	522	816	1,006	845	887	811	1,018	1,073
Kentucky	107	93	139	169	214	293	306	213	173	399	440
Louisiana	254	278	310	281	302	379	401	513	570	695	778
North	114	136	119	106	136	210	195	177	214	242	265
South	140	142	191	175	166	169	206	336	356	453	513
Michigan	247	275	313	344	338	332	277	279	243	212	168
Mississippi	79	94	108	115	130	174	182	207	178	182	220
Montana	47	42	30	45	49	50	98	126	123	172	195
Nebraska	14	7	30	18	82	134	168	161	185	415	451
New Mexico	44	47	71	74	79	105	165	168	156	158	278
North Dakota	0	0	0	0	3	6	36	91	117	69	78
Ohio	64	51	52	37	19	35	41	22	22	27	13
Oklahoma	573	843	831	804	840	830	730	742	859	832	867
Pennsylvania	0	21	24	6	4	10	20	20	46	16	19
South Dakota	3	1	0	0	12	7	14	20	22	16	9
Texas	1,591	1,895	2,568	2,791	3,443	4,408	4,851	5,245	5,190	5,124	5,610
North Central (9)	550	330	429	475	607	862	1,048	1,058	1,131	975	1,115
West Central (7-B)	55	276	469	592	729	1,019	1,035	1,062	971	1,035	1,075
West (7-C & 8)	224	213	314	343	669	844	870	876	938	839	898
Panhandle (10)	5	15	15	19	24	36	80	26	94	65	125
East (5 & 6)	114	137	142	186	223	255	252	300	334	367	431
Gulf Coast (2)	300	380	500	450	480	299	336	369	312	344	308
Gulf Coast (3)	75	37	79	81	83	363	390	519	526	517	562
Southwest (1)	68	107	80	95	98	249	348	432	385	481	498
Southwest (4)	200	400	540	550	530	481	492	603	499	501	598
Utah	3	4	18	19	13	32	50	42	65	71	86
West Virginia	0	104	82	24	43	17	14	23	51	30	27
Wyoming	54	67	104	131	122	141	173	189	271	262	289
Miscellaneous	10	25	61	73	29	95	112	41	41	57	81
Total United States	**4,518**	**5,461**	**6,877**	**7,294**	**8,554**	**10,302**	**10,552**	**11,062**	**11,280**	**12,271**	**13,034**

. . . and average depth—from 3,321 to 4,022 ft.

(Average in feet)

	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956
Alabama	4,529	4,146	5,260	4,657	4,368	5,380	5,722	5,257	5,221	4,878	8,789
Arkansas	3,979	4,282	4,218	3,984	3,296	3,549	3,721	3,684	3,609	3,270	2,997
California	4,195	4,269	3,678	4,157	4,356	4,052	4,239	4,443	4,642	5,162	4,581
Colorado	6,316	5,507	5,932	4,378	4,132	4,929	5,309	5,218	5,458	5,370	5,100
Florida	6,368	6,182	5,939	7,529	5,893	10,047	6,256	6,517	6,406	6,638	6,984
Illinois	2,529	2,583	2,620	2,347	2,236	2,493	2,472	2,506	2,428	2,390	2,303
Indiana	1,839	1,771	1,870	1,843	1,722	1,793	1,766	1,642	1,556	1,563	1,678
Kansas	3,234	3,226	3,238	3,459	3,178	3,340	3,395	3,391	3,458	3,549	3,462
Kentucky	1,625	1,810	1,668	1,770	1,805	1,842	1,976	2,033	1,922	1,490	1,419
Louisiana	6,116	5,357	4,703	5,262	5,933	6,334	6,567	6,763	6,064	6,490	7,339
Michigan	2,219	2,129	2,215	2,220	2,362	2,494	2,557	2,573	2,720	2,973	2,889
Mississippi	7,581	8,416	7,738	7,150	7,214	6,771	7,013	6,926	7,170	7,453	7,241
Montana	2,111	2,038	2,375	2,328	2,301	2,443	3,643	4,287	4,295	4,691	4,930
Nebraska, Missouri	1,980	1,689	709	2,240	3,191	4,083	4,447	5,039	5,137	5,603	5,490
New Mexico	3,951	4,470	4,293	4,828	4,526	4,886	5,539	5,654	5,471	4,237	4,443
New York	1,433	1,439	1,438	1,434	1,437	1,440	1,369	1,447	1,446	1,460	1,465
North Dakota					9,038	5,425	8,213	7,267	7,200	7,096	7,518
Ohio	2,669	2,842	2,511	2,110	2,115	2,119	2,181	2,105	2,023	2,098	2,378
Oklahoma	3,204	3,159	3,614	3,525	3,639	3,651	3,740	3,440	3,553	3,273	3,453
Pennsylvania	1,613	1,578	1,636	1,605	1,717	1,800	1,971	1,977	3,273	2,534	2,436
Texas	4,402	4,411	4,305	4,205	4,340	4,601	4,301	4,626	4,516	4,303	4,304
Utah	2,139	6,713	4,140	5,001	4,069	5,473	6,395	5,653	4,139	4,314	4,893
West Virginia	2,735	2,707	2,592	2,873	2,643	2,844	2,887	2,710	2,776	2,505	2,694
Wyoming	4,261	4,506	4,282	4,775	4,869	5,086	5,042	4,730	5,354	4,901	4,265
Miscellaneous	3,125	2,884	1,986	1,933	3,221	3,035	3,624	2,886	2,966	3,078	4,771
Total United States	**3,321**	**3,445**	**3,454**	**3,538**	**3,680**	**3,871**	**4,085**	**4,035**	**4,061**	**3,992**	**4,022**

Well Tally—County, Result, Footage

ALABAMA
Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Baldwin	0	0	1	1	8,249
Bullock	0	0	1	1	1,685
Butler	0	0	1	1	3,008
Choctaw	0	0	3	3	12,658
Clarke	0	0	2	2	10,615
Conecuh	0	0	1	1	4,425
Cullman	0	0	1	1	3,675
Escambia	0	0	4	4	25,358
Fayette	0	1	1	2	7,061
Henry	0	0	1	1	6,610
Marion	0	0	3	3	6,373
Mobile	0	0	2	2	24,500
Monroe	0	0	1	1	4,011
Tuscaloosa	0	0	1	1	3,210
Walker	0	0	1	1	1,882
Washington	0	0	3	3	17,901
Wilcox	0	0	1	1	2,014
Winston	0	0	1	1	3,116
Total	0	1	29	30	146,351

ALABAMA
Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Baldwin	2	0	0	2	10,976
Choctaw	3	0	1	4	13,458
Mobile	51	0	4	55	628,990
Total	56	0	5	61	653,424

ARKANSAS
Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Arkansas	0	0	1	1	3,912
Benton	0	0	1	1	2,338
Bradley	0	0	1	1	3,354
Calhoun	0	0	1	1	4,989
Clay	0	0	4	4	5,291
Columbia	0	0	8	8	38,098
Conway	0	1	0	1	3,500
Crawford	0	0	2	2	5,560
Crittenden	0	0	1	1	3,450
Faulkner	0	0	1	1	4,015
Franklin	0	1	0	1	5,700
Grant	0	0	1	1	2,200
Greene	0	0	1	1	2,008
Hempstead	0	0	1	1	2,582
Hot Springs	0	0	2	2	1,060
Lafayette	4	1	33	38	146,283
Lincoln	0	0	1	1	4,803
Little River	0	0	4	4	12,435
Madison	0	0	4	4	4,366
Miller	4	0	18	22	109,814
Nevada	6	0	16	22	63,923
Ouachita	5	1	8	14	44,090
Phillips	0	0	3	3	12,479
Pope	0	1	1	2	11,748
Pulaski	0	0	1	1	3,910
Saline	0	0	1	1	816
Searcy	0	0	1	1	1,260
Sebastian	0	1	0	1	7,520
Union	14	2	33	49	198,169
Total	33	8	149	190	709,673

ARKANSAS
Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Columbia	31	0	8	39	132,055
Franklin	0	4	3	7	29,726
Lafayette	14	0	22	36	131,347
Miller	36	0	21	57	253,440
Nevada	71	0	36	107	222,835
Ouachita	209	0	31	240	621,900
Pope	0	0	1	1	4,678
Sebastian	0	1	1	2	12,315
Union	263	0	60	323	884,724
Total	624	5	183	812	2,293,020

CALIFORNIA
Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Alameda	0	0	1	1	7,292
Butte	0	0	2	2	7,002
Colusa	0	1	12	13	67,985
Contra Costa	0	0	2	2	9,995
Fresno	2	0	20	22	163,138
Glenn	0	3	10	13	85,324
Humboldt	0	0	1	1	7,002
Kern	24	1	167	192	883,416
Kings	1	0	12	13	66,371
Los Angeles	7	0	38	45	289,325
Mendocino	0	0	1	1	1,900
Merced	0	0	1	1	3,627
Monterey	0	0	7	7	19,361
Orange	6	0	30	36	197,909
Placer	0	0	1	1	3,382
Riverside	0	0	5	5	15,072
Sacramento	0	2	2	4	27,812
San Benito	3	1	17	21	44,255
San Bernardino	0	0	15	15	44,532
San Joaquin	0	1	7	8	41,857
San Luis Obispo	0	0	22	22	83,847
San Mateo	1	0	8	9	35,514
Santa Barbara	1	0	19	20	100,695
Santa Clara	0	0	2	2	1,939
Santa Cruz	0	0	1	1	3,537
Solano	0	0	6	6	35,173
Sutter	0	0	2	2	5,958
Tehama	0	0	1	1	5,060
Tulare	0	0	13	13	49,162
Ventura	4	0	38	42	354,536
Yolo	0	0	6	6	29,326
Total	49	9	469	527	2,717,437

CALIFORNIA
Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Butte	0	2	1	3	14,611
Colusa	0	2	3	5	13,720
Fresno	112	0	4	116	531,623
Glenn	0	11	4	15	94,620
Kern	571	9	49	629	2,139,525
Kings	7	0	1	8	29,456
Los Angeles	433	0	16	449	2,299,592
Madera	0	3	0	3	11,391
Monterey	94	0	1	95	206,774
Orange	231	1	12	244	1,033,345
Riverside	0	0	1	1	871
Sacramento	0	2	1	3	12,745
San Benito	7	1	1	9	26,651
San Bernardino	7	0	0	7	14,373
San Luis Obispo	3	0	0	3	7,746
San Mateo	1	0	1	2	6,811
Santa Barbara	14	0	4	18	68,026
Solano	0	4	0	4	23,802
Sonoma	0	2	0	2	3,338
Sutter	0	2	0	2	4,800
Tulare	4	1	0	5	6,742
Ventura	147	1	8	156	1,296,545
Total	1,631	42	106	1,779	7,847,107

COLORADO
Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Adams	2	0	36	38	238,354
Arapahoe	0	0	2	2	11,388
Baca	0	0	7	7	38,938
Bent	0	1	6	7	35,927
Boulder	0	0	6	6	12,289
Cheyenne	0	0	1	1	4,765
Crowley	0	0	1	1	7,578
Delta	0	1	4	5	8,165
Dolores	0	0	1	1	8,190
Eagle	0	0	1	1	8,310
Elbert	0	0	3	3	18,864
El Paso	0	0	5	5	21,386
Garfield	0	1	1	2	11,589
Huerfano	0	0	2	2	11,170
Jackson	0	1	5	6	28,920
Jefferson	0	0	1	1	9,771
Kiowa	0	1	1	2	11,153
Kit Carson	0	0	9	9	31,071
La Plata	0	1	16	17	63,043
Las Animas	0	0	3	3	11,070
Larimer	1	0	6	7	35,969
Lincoln	0	0	16	16	72,885
Logan	6	2	86	94	499,906
Mesa	0	3	11	14	44,174
Moffat	0	2	8	10	45,471
Montezuma	0	0	13	13	40,402
Montrose	0	0	5	5	7,686
Morgan	7	1	66	74	433,840
Park	0	0	6	6	26,319
Phillips	0	0	3	3	12,088
Prowers	0	0	3	3	16,652
Pueblo	0	0	8	8	24,476
Rio Blanco	1	1	14	16	104,217
Routt	0	1	6	7	18,305
Sedgwick	0	1	16	17	63,349
Saguache	0	0	1	1	3,784
Washington	7	0	165	172	819,809
Weld	2	3	51	56	375,718
Yuma	0	0	34	34	131,093
Total	26	20	629	675	3,368,084

COLORADO
Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Adams	11	1	13	25	136,745
Archuleta	0	1	0	1	5,452
Baca	0	1	1	2	9,548
Bent	1	1	0	2	10,952
Garfield	0	2	1	3	9,674
Jackson	11	1	5	17	59,975
Kiowa	0	1	0	1	5,000
Kit Carson	0	0	1	1	5,820
La Plata	0	48	9	57	296,232
Larimer	3	0	4	7	39,604
Logan	36	8	54	98	513,915
Mesa	0	1	0	1	3,033
Moffat	12	8	2	22	19,413
Montezuma	2	1	3	6	9,173
Morgan	36	3	40	79	453,071
Rio Blanco	2	5	3	10	39,594
Routt	3	0	5	8	21,975
Washington	69	2	72	143	805,399
Weld	39	3	22	64	418,996
Total	225	87	235	547	2,863,571

FLORIDA
Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Bay	0	0	1	1	5,004
Escambia	0	0	3	3	25,629
Gladsden	0	0	1	1	4,223
Holmes	0	0	1	1	4,016
Indian River	0	0	1	1	9,488
Lee	0	0	1	1	11,800
Liberty	0	0	1	1	4,119
Santa Rosa	0	0	3	3	21,287
Walton	0	0	1	1	5,223
Total	0	0	13	13	90,789

GEORGIA
Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Clinch	0	0	2	2	4,792
Coffee	0	0	1	1	3,550
Marion	0	0	2	2	5,744
Pulaski	0	0	1	1	6,500
Sumpter	0	0	1	1	2,250
Wheeler	0	0	1	1	4,002
Total	0	0	8	8	26,838

ILLINOIS
Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Adams	0	1	4	5	3,024
Alexander	0	0	1	1	453
Bond	5	0	35	40	78,021
Brown	0	0	2	2	1,490
Cass	0	0	1	1	2,311

	Oil	Gas	Dry	Total	Footage
Champaign	0	0	6	6	7,637
Christian	1	0	42	43	89,967
Clark	0	0	14	14	21,018
Clay	2	0	3	5	14,272
Clinton	3	1	49	53	113,846
Coles	4	0	35	39	68,069
Crawford	0	1	9	10	15,190
Cumberland	0	0	5	5	8,861
Douglas	4	0	66	70	115,393
Edgar	0	0	7	7	9,760
Edwards	3	0	3	6	18,197
Effingham	0	0	11	11	26,427
Fayette	0	0	9	9	18,415
Franklin	3	0	10	13	39,728
Fulton	0	0	1	1	1,100
Gallatin	0	0	15	15	38,671
Greene	0	0	1	1	715
Hamilton	0	0	14	14	47,639
Hancock	0	0	2	2	1,029
Jackson	1	0	3	4	4,434
Jasper	0	0	19	19	46,097
Jefferson	5	0	17	22	56,129
Jersey	0	0	1	1	1,445
Johnson	0	0	1	1	2,450
Kankakee	0	0	1	1	1,000
Kendall	0	0	1	1	455
Lawrence	1	0	2	3	5,539
Logan	0	0	2	2	3,297
McDonough	0	0	2	2	1,631
Macon	0	0	8	8	18,630
Macoupin	1	0	11	12	15,451
Madison	0	1	32	33	44,531
Marion	4	0	9	13	34,837
Massac	0	0	2	2	2,187
Menard	0	0	1	1	1,887
Montgomery	0	0	34	34	66,031
Morgan	0	0	3	3	2,353
Moultrie	0	0	20	20	42,338
Peoria	0	0	1	1	1,902
Perry	1	0	15	16	27,803
Pratt	0	0	3	3	4,728
Pike	0	1	7	8	4,669
Pope	0	0	2	2	3,763
Pulaski	0	0	1	1	1,756
Randolph	0	0	4	4	6,068
Richland	2	0	3	5	14,265
Saline	7	0	41	48	141,933
Sangamon	0	0	20	20	36,492
Schuyler	0	0	2	2	1,376
Shelby	0	0	17	17	39,452
St. Clair	0	0	3	3	5,387
Union	0	0	2	2	1,580
Wabash	0	0	2	2	4,921
Washington	2	0	39	41	88,184
Wayne	2	0	11	13	42,411
White	0	0	11	11	37,013
Williamson	0	0	18	18	50,162
Total	51	5	716	772	1,605,826

ILLINOIS

Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Adams	0	3	1	4	2,066
Bond	42	0	55	97	185,999
Christian	30	0	19	49	93,544
Clark	33	0	28	61	68,028
Clay	70	0	57	127	364,416
Clinton	26	1	35	62	122,182
Coles	136	6	83	225	412,083
Crawford	111	1	94	206	274,300
Cumberland	0	0	6	6	9,165
Douglas	95	6	72	173	300,553
Edgar	4	1	21	26	16,150
Edwards	29	0	38	67	234,920
Effingham	12	0	13	25	61,784
Fayette	9	0	10	19	33,404
Franklin	36	0	35	71	218,283
Gallatin	73	0	53	126	351,039
Hamilton	84	0	74	158	525,450
Hancock	0	0	1	1	815
Jasper	68	0	45	113	293,921
Jefferson	30	0	36	66	184,641
Lawrence	117	0	54	171	289,984
Macon	1	0	4	5	10,834
Macoupin	0	0	3	3	1,556
Madison	3	0	8	11	10,114
Marion	27	0	21	48	134,439
Montgomery	0	0	4	4	6,636
Morgan	0	1	2	3	2,199
Moultrie	0	0	2	2	5,412
McDonough	1	0	3	4	1,871
Perry	0	0	10	10	13,611
Pike	0	37	3	40	19,653
Richland	39	0	34	73	222,738
Saline	102	0	75	177	522,398
Schyler	0	0	3	3	1,317
St. Clair	0	0	2	2	760
Sangamon	0	0	8	8	11,723
Shelby	1	0	2	3	7,295
Wabash	90	0	88	178	415,174
Washington	51	2	48	101	166,496
Wayne	143	0	92	235	759,830
White	160	0	111	271	803,455
Williamson	0	0	2	2	5,183
Total	1,623	58	*1,355	3,036	7,165,423

*Five service wells.

INDIANA

Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Crawford	0	0	2	2	2,760
Daviess	0	0	5	5	7,226
Decatur	0	1	0	1	864
DeKalb	0	0	2	2	602
Dubois	1	0	14	15	15,550
Gibson	5	0	9	14	29,100
Grant	0	0	1	1	1,336
Greene	0	0	2	2	1,932
Knox	0	0	3	3	4,394
Lawrence	0	0	3	3	2,450
Madison	0	0	1	1	975
Martin	0	0	2	2	1,237
Morgan	0	0	2	2	3,572
Orange	0	0	2	2	2,572
Perry	0	0	10	10	9,457
Pike	0	0	3	3	3,953
Posey	6	0	13	19	51,883
Putnam	0	0	1	1	1,000
Spencer	1	0	7	8	10,337
Sullivan	0	0	12	12	20,790
Vanderburgh	1	0	7	8	10,337
Vermillion	1	0	3	4	5,766
Vigo	0	0	17	17	22,727
Wabash	0	0	1	1	894
Warrick	0	0	5	5	9,117
Whitley	0	0	2	2	3,132
Total	16	1	128	145	228,663

INDIANA

Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Allen	1	0	0	1	1,417
Crawford	2	0	3	5	6,600
Daviess	5	0	12	17	15,937
Decatur	0	1	0	1	859
Dubois	3	0	22	25	18,100
Gibson	59	0	60	119	227,062
Hancock	0	1	0	1	1,018
Jay	1	1	3	5	5,580
Knox	3	1	8	12	18,730
Martin	0	0	3	3	2,428
Miami	4	0	2	6	5,523
Monroe	0	0	1	1	900
Perry	0	0	7	7	3,357
Pike	32	0	18	50	60,930
Posey	94	0	103	197	458,370
Randolph	0	0	1	1	1,475
Shelby	0	2	0	2	1,763
Spencer	19	0	32	51	53,343
Sullivan	7	0	5	12	10,816
Vanderburgh	37	0	26	63	99,613
Vermillion	1	0	3	4	5,049
Vigo	1	0	3	4	5,960
Warrick	0	0	3	3	3,656
Wells	3	0	3	6	6,101
Total	272	6	*318	596	1,014,507

*Seven service wells.

KANSAS

Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Barber	2	14	43	59	276,492
Barton	11	0	20	31	107,339
Butler	1	0	20	21	61,441
Chase	0	0	10	10	23,773
Chautauqua	2	1	19	22	48,982
Clark	1	1	9	11	51,919
Clay	0	0	3	3	6,790
Cloud	0	0	4	4	15,476
Coffey	1	0	4	5	8,538
Comanche	1	0	6	7	39,082
Cowley	8	0	41	49	151,588
Decatur	3	0	6	9	34,756
Dickinson	1	0	9	10	25,823
Douglas	0	0	2	2	3,202
Dickinson	1	0	9	10	25,823
Edwards	5	2	16	23	116,217
Elk	3	0	4	7	18,396
Ellis	12	0	42	54	197,744
Ellsworth	2	0	5	7	23,217
Finney	1	0	7	8	37,502
Ford	1	0	6	7	39,394
Franklin	0	0	1	1	1,700
Gove	0	0	2	2	9,152

1956 Wildcat and field drilling

	Oil	Gas	Dry	Total	Footage
Graham	6	0	44	50	138,296
Greeley	0	0	4	4	21,903
Greenwood	0	0	4	4	9,028
Hamilton	0	0	2	2	10,829
Harper	2	0	16	18	89,173
Harvey	0	0	12	12	41,136
Haskell	0	0	2	2	11,950
Hodgeman	2	0	6	8	35,611
Jefferson	0	0	1	1	1,760
Jewell	0	0	1	1	2,715
Kearny	1	0	1	2	11,317
Kingman	3	2	22	27	121,784
Kiowa	1	5	20	26	130,222
Labette	0	0	1	1	1,220
Lane	0	0	1	1	4,775
Leavenworth	0	0	2	2	4,258
Lincoln	0	0	2	2	7,972
Logan	0	0	4	4	19,225
Lyon	0	0	7	7	20,357
McPherson	2	0	22	24	84,350
Marion	5	0	47	52	149,071
Meade	4	5	4	13	78,005
Morris	0	0	17	17	40,793
Morton	1	7	2	10	50,550
Ness	5	0	28	33	148,490
Norton	0	0	16	16	60,237
Pawnee	4	1	32	37	152,621
Phillips	0	0	4	4	14,483
Pratt	3	0	12	15	69,632
Rawlins	0	0	2	2	9,790
Reno	0	0	29	29	120,100
Rice	2	0	10	12	41,174
Rooks	3	0	16	19	63,609
Rush	1	1	18	20	77,536
Russell	1	0	9	10	33,593
Saline	0	0	3	3	10,125
Scott	0	0	3	3	14,370
Sedgwick	4	0	30	34	123,243
Seward	0	3	1	4	24,013
Shawnee	0	0	1	1	3,798
Sheridan	2	0	17	19	81,381
Sherman	0	0	1	1	5,471
Stafford	11	2	33	46	184,200
Stanton	0	0	2	2	11,034
Stevens	0	2	2	4	27,054
Sumner	4	0	35	39	154,982
Thomas	1	0	6	7	33,764
Trego	4	0	49	53	225,420
Waubaunsee	0	0	4	4	10,046
Wallace	0	1	1	2	10,848
Wichita	0	0	2	2	10,200
Wilson	0	0	2	2	3,339
Woodson	2	0	6	8	11,710
Total	*129	47	897	1,073	4,186,086

*Incl. 2 dist.

KANSAS

Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Barber	29	63	51	143	660,061
Barton	122	1	114	237	774,108
Butler	63	1	42	106	282,974
Chautauqua	69	6	62	137	254,547
Clark	1	2	7	10	50,658
Coffey	1	0	8	9	15,115
Comanche	0	1	1	2	11,652
Cowley	190	8	123	321	906,478
Decatur	10	0	12	22	78,587
Dickinson	6	0	8	14	33,221
Edwards	0	3	7	10	45,499
Elk	22	2	34	58	102,800
Ellis	149	0	109	258	930,836
Ellsworth	26	0	23	49	163,053
Finney	8	41	3	52	156,825
Ford	0	1	0	1	5,100
Gove	1	0	0	1	4,570
Graham	129	0	71	200	782,285
Grant	0	2	0	2	5,330
Greenwood	104	0	54	158	326,516
Hamilton	0	2	1	3	10,527
Harper	31	1	11	43	185,283
Harvey	10	2	12	24	80,113
Haskell	4	19	1	24	78,326
Hodgeman	1	0	0	1	4,560
Kearny	0	26	5	31	87,698
Kingman	61	22	28	111	486,112
Kiowa	14	3	10	27	136,067
Lyon	13	0	5	18	35,756
McPherson	72	1	42	115	355,478
Marion	153	0	50	205	546,932
Meade	19	19	7	45	264,061
Montgomery	2	4	7	13	19,952
Morris	28	0	6	34	102,235
Morton	29	59	12	100	365,468

1956 Wildcat and field drilling

	Oil	Gas	Dry	Total	Footage
Ness	21	0	12	33	143,377
Norton	2	0	4	6	22,214
Pawnee	88	4	44	136	588,705
Phillips	6	0	3	9	31,954
Pratt	10	0	14	24	106,248
Reno	4	0	14	18	68,451
Rice	77	2	49	128	430,317
Rooks	64	0	71	135	497,299
Rush	24	1	13	38	140,967
Russell	92	0	46	138	444,330
Saline	2	0	1	3	8,072
Sedgwick	53	1	29	83	263,676
Seward	0	19	0	19	54,660
Sheridan	5	0	4	9	35,856
Stafford	105	0	94	199	769,552
Stanton	0	4	1	5	26,820
Stevens	0	10	0	10	28,281
Sumner	85	3	46	134	477,832
Trego	55	0	26	81	316,204
Waubaunsee	0	0	1	1	3,195
Wallace	0	0	1	1	5,241
Wilson	2	0	3	5	4,765
Woodson	47	1	21	69	100,622
Total	2,111	334*	1,423	3,868	12,917,421

*Incl 78 service wells.

EASTERN KENTUCKY
Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Breathitt	0	0	3	3	7,017
Clay	0	0	1	1	4,716
Floyd	0	0	1	1	4,140
Leslie	4	0	4	8	19,959
Total	4	0	9	13	35,832

EASTERN KENTUCKY
Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Bell	0	1	1	2	7,063
Breathitt	4	1	4	10	14,859
Clay	0	0	1	1	3,799
Floyd	1	7	9	17	32,766
Knott	1	25	0	26	75,502
Lawrence	3	17	0	20	26,763
Letcher	0	6	2	8	29,791
Magoffin	1	10	3	14	25,050
Martin	1	2	3	6	13,509
Perry	0	1	0	1	3,001
Pike	2	83	10	96	318,514
Total	13	153	34	200	550,617

WESTERN KENTUCKY
Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Breckenridge	3	0	20	23	11,809
Butler	2	0	41	43	48,621
Caldwell	0	0	14	14	19,439
Christian	6	0	70	76	64,402
Crittenden	0	0	2	2	10,929
Daviess	0	0	10	10	15,679
Grayson	0	0	13	13	10,504
Hancock	0	0	3	3	2,423
Henderson	7	0	11	18	42,231
Hopkins	2	1	16	19	48,408
Livingston	0	0	1	1	2,026
Logan	0	0	4	4	5,051
McLean	3	0	15	18	37,239
Muhlenberg	12	0	98	110	147,851
Ohio	1	0	24	25	27,468
Todd	1	0	30	31	28,198
Trigg	0	0	1	1	2,150
Union	1	0	5	6	10,542
Welister	1	0	9	10	17,868
Total	39	1	387	427	552,838

WESTERN KENTUCKY
Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Breckenridge	40	0	32	72	29,088
Butler	16	0	10	26	10,634
Caldwell	0	0	1	1	1,530
Christian	209	5	92	306	226,061
Daviess	48	2	53	103	142,366
Hancock	3	0	9	12	7,150
Henderson	101	2	77	180	318,666
Hopkins	0	0	8	8	12,749
Logan	0	0	1	1	736
McLean	44	0	53	97	165,500
Muhlenberg	181	0	137	318	376,136
Ohio	6	0	10	16	16,868
Todd	4	1	8	13	11,803
Union	22	0	20	42	92,988
Webster	65	1	35	101	196,405
Total	739	11	*546	1,296	1,608,680

*Incl. 6 service wells.

LOUISIANA OFFSHORE
Wildcat Completions by Parishes

	Oil	Gas	Dry	Total	Footage
Cameron	3	6	4	13	150,859
Jefferson	2	1	0	3	46,960
Lafourche	0	0	2	2	24,092
Plaquemines	8	6	16	30	351,371
St. Bernard	0	0	1	1	8,010
St. Mary	6	1	5	12	148,132
Terrebonne	3	2	3	8	107,651
Vermilion	2	1	7	10	106,957
Total	*24	17	38	79	944,032

*Includes 6 condensate wells.

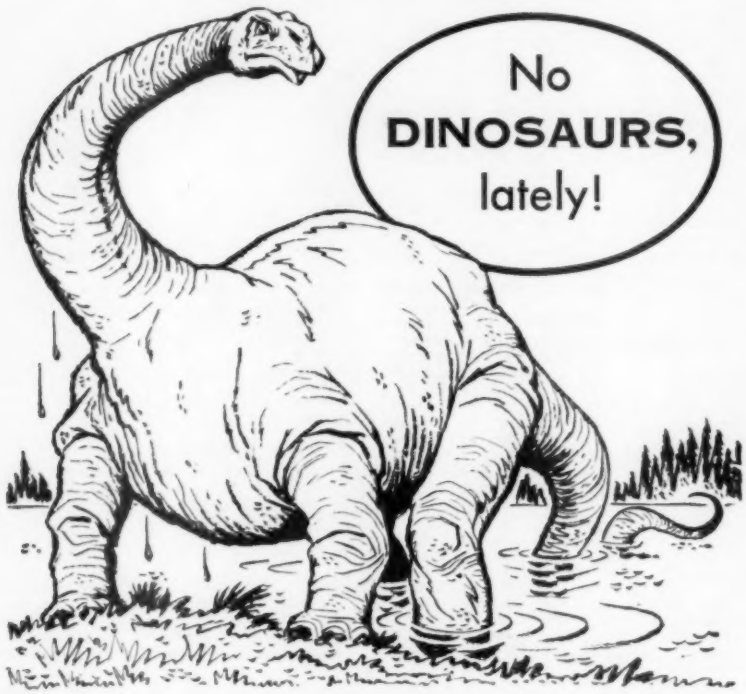
LOUISIANA OFFSHORE
Development Completions by Parishes

	Oil	Gas	Dry	Total	Footage
Cameron	2	8	6	16	187,729
Iberia	0	0	2	2	31,475
Jefferson	13	2	6	21	205,614
Lafourche	23	3	9	35	231,455
Plaquemines	143	11	40	194	1,746,543
St. Bernard	1	0	2	3	20,520
St. Mary	20	1	10	31	318,870
Terrebonne	16	2	26	44	425,298
Vermilion	0	1	0	1	11,125
Total	*218	28	101	347	3,178,629

*Includes 7 condensate wells.

NORTH LOUISIANA
Wildcat Completions by Parishes

	Oil	Gas	Dry	Total	Footage
Bienville	0	0	3	3	11,569



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	Oil	Gas	Dry	Total	Footage
Bossier	4	0	24	28	105,594
Caddo	7	1	11	19	68,935
Caldwell	0	0	3	3	17,047
East Carroll	0	0	1	1	2,724
Catahoula	2	0	22	24	146,710
Claiborne	6	1	5	12	69,970
Concordia	1	0	36	37	245,493
DeSoto	2	0	16	18	66,509
Franklin	3	0	9	12	71,583
Jackson	0	0	1	1	7,406
LaSalle	3	0	14	17	74,839
Lincoln	0	0	1	1	8,307
Madison	0	0	4	4	18,512
Morehouse	0	0	1	1	3,010
Natchitoches	1	0	4	5	19,709
Ouachita	0	0	1	1	11,181
Red River	0	0	12	12	33,731
Richland	0	0	5	5	23,277
Sabine	1	1	10	12	49,777
Tensas	1	0	23	24	205,055
Union	1	0	8	9	63,877
Webster	5	0	8	13	70,603
Winn	0	0	3	3	12,190
Total	*37	3	225	265	1,407,608

*Includes 3 dist.

NORTH LOUISIANA
Development Completions by Parishes

	Oil	Gas	Dry	Total	Footage
Bienville	8	6	8	22	99,657
Bossier	38	10	20	68	273,656
Caddo	640	20	61	721	1,520,494
East Carroll	0	0	1	1	2,350
West Carroll	0	3	3	6	13,611
Catahoula	19	0	19	38	192,919
Claiborne	27	8	16	51	411,028
Concordia	14	0	19	33	218,121
DeSoto	29	24	47	100	395,776
Franklin	12	2	21	35	183,533
Grant	8	0	3	11	21,843
LaSalle	43	0	27	70	218,097
Lincoln	0	5	2	7	64,706
Morehouse	0	5	0	5	11,057
Natchitoches	0	0	1	1	1,192
Ouachita	0	1	1	2	12,100
Red River	1	0	5	6	16,379
Richland	7	4	8	19	56,972
Sabine	5	2	17	24	81,637
Tensas	22	2	16	40	331,637
Union	3	63	4	70	153,211
Webster	58	3	22	83	365,600
Winn	14	0	10	24	29,805
Total	*948	158	331	1,437	4,675,381

*Includes 9 dist.

SOUTH LOUISIANA ONSHORE
Wildcat Completions by Parishes

	Oil	Gas	Dry	Total	Footage
Acadia	8	4	12	24	287,489
Allen	7	2	12	21	196,166
Ascension	1	0	3	4	49,393
Assumption	1	0	5	6	74,854
Avoyelles	1	0	1	2	17,271
Beauregard	6	1	30	37	320,427
Calcasieu	3	9	18	30	286,262
Cameron	7	1	25	33	399,596
E. Baton Rouge	0	0	3	3	31,219
Evangeline	0	1	7	8	74,074
Iberia	6	1	5	12	156,297
Iberville	2	0	11	13	151,854
Jefferson	6	2	6	14	154,333
Jefferson Davis	4	2	6	12	148,491
Lafayette	3	1	2	6	86,956
Lafourche	7	6	19	32	423,165
Plaquemines	13	1	28	42	516,188
Pointe Coupee	2	0	5	7	69,617
Rapides	0	0	3	3	20,545
St. Charles	3	2	11	16	194,417
St. James	0	0	4	4	47,785
St. John the Baptist	0	0	1	1	11,700
St. Landry	3	2	12	17	173,390
St. Martin	6	2	9	17	226,287
St. Mary	3	0	10	13	163,246
St. Tammany	0	0	1	1	8,017
Tangipahoa	0	0	1	1	10,199
Terrebonne	11	3	20	34	478,566
Vermilion	4	3	8	15	195,021
Vernon	0	0	0	0	1,149
W. Baton Rouge	0	0	5	5	50,378
W. Feliciana	0	0	1	1	8,204
Total	*107	43	284	434	5,032,556

*Includes 41 condensate wells.

SOUTH LOUISIANA ONSHORE
Development Completions by Parishes

	Oil	Gas	Dry	Total	Footage
Acadia	35	10	25	70	704,789
Allen	14	6	9	29	257,260
Ascension	4	0	3	7	46,689
Assumption	7	6	10	23	246,003
Avoyelles	0	0	2	2	16,844
Beauregard	42	3	17	62	504,915
Calcasieu	44	9	20	73	543,922
Cameron	58	17	30	105	1,023,009
E. Baton Rouge	1	0	3	4	43,444
Evangeline	5	0	1	6	57,761
Iberia	38	3	23	64	637,771
Iberville	36	4	16	56	480,419
Jefferson	23	1	10	34	359,205
Jefferson Davis	8	12	13	33	381,998
Lafayette	3	1	2	6	72,927
Lafourche	102	22	48	172	1,885,679
Plaquemines	96	3	36	135	1,409,301
Pointe Coupee	0	0	1	1	13,773
Rapides	0	0	6	6	42,863
St. Bernard	1	0	0	1	8,596
St. Charles	10	4	12	26	265,527
St. James	3	1	3	7	75,719
St. Landry	25	8	19	52	338,701
St. Martin	49	3	36	88	792,413

1956 Wildcat and field drilling

	Oil	Gas	Dry	Total	Footage
St. Mary	47	10	22	79	881,019
St. Tammany	0	1	0	1	9,990
Terrebonne	76	12	34	122	1,503,439
Vermilion	20	16	11	47	538,422
W. Baton Rouge	1	0	1	2	17,834
Total	*748	152	413	1,313	13,200,232

*Includes 92 condensate wells.

MICHIGAN
Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Allegan	2	1	8	11	19,182
Arenac	1	0	4	5	18,352
Bay	0	0	6	6	20,616
Branch	0	0	2	2	5,088
Calhoun	0	0	2	2	5,613
Clare	1	0	1	2	5,459
Clinton	0	0	1	1	2,547
Genesee	0	0	1	1	2,640

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1956 Wildcat and field drilling

	Oil	Gas	Dry	Total	Footage
Gladwin	1	0	3	4	18,230
Gratiot	0	0	5	5	14,412
Grand Traverse	0	0	1	1	1,795
Hillsdale	0	0	1	1	2,455
Huron	0	0	1	1	3,705
Ionia	0	0	1	1	2,878
Isabella	0	0	6	6	22,447
Jackson	0	0	1	1	2,321
Kalkaska	0	0	3	3	9,814
Kent	0	0	1	1	2,256
Lapeer	1	0	0	1	1,467
Lake	0	0	2	2	6,503
Lenawee	0	0	1	1	2,063
Luce	0	0	1	1	205
Macomb	0	0	1	1	2,815
Mason	0	0	11	11	23,815
Mecosta	1	0	5	6	22,078
Midland	0	0	2	2	7,157
Missaukee	0	0	1	1	3,962
Montcalm	1	0	16	17	54,457
Muskegon	0	0	3	3	6,892
Newaygo	0	0	19	19	44,964
Oakland	0	0	2	2	6,145
Oceana	0	0	17	17	39,773
Ogemaw	0	0	3	3	12,099
Osceola	0	1	3	4	15,902
Otsego	0	0	2	2	3,150
Ottawa	1	0	7	8	15,798
Presque Isle	0	0	1	1	4,500
Roscommon	1	0	0	1	5,165
St. Clair	0	0	1	1	3,400
Saginaw	0	0	2	2	5,486
Tuscola	0	0	2	2	13,328
Van Buren	0	0	2	2	2,727
Washtenaw	0	0	2	2	8,193
Wayne	0	0	2	2	3,044
Total	10	2	156	168	475,898

MICHIGAN

Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Allegan	28	2	7	37	66,411
Arenac	14	0	1	15	61,623
Bay	13	0	0	13	39,313
Barry	1	0	1	2	2,969
Clare	15	0	4	19	87,174
Crawford	2	0	0	2	8,616
Gladwin	8	0	2	10	39,444
Gratiot	4	0	2	6	16,086
Isabella	3	0	3	6	22,649
Jackson	0	0	2	2	3,836
Kalamazoo	9	0	5	14	17,952
Kent	2	0	0	2	3,713
Mason	1	0	2	3	8,989
Mecosta	1	1	1	3	7,469
Midland	4	0	3	7	25,483
Missaukee	1	0	0	1	4,506
Montcalm	26	0	5	31	102,280
Muskegon	5	0	4	9	18,369
Newaygo	9	1	3	13	29,259
Oakland	0	0	1	1	25
Oceana	2	0	4	6	10,868
Ogemaw	3	0	2	5	19,542
Osceola	2	1	0	3	13,798
Ottawa	10	0	3	13	23,336
Roscommon	9	0	1	10	52,541
St. Clair	0	0	1	1	2,842
Saginaw	4	0	0	4	10,359
Tuscola	13	0	1	14	44,060
Van Buren	2	0	2	4	4,402
Washtenaw	1	0	4	5	9,758
Wayne	0	5	3	8	28,940
Total	192	10	67	269	786,612

MISSISSIPPI

Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Adams	6	0	45	51	330,549
Amite	0	0	2	2	14,505
Claiborne	0	0	2	2	20,573
Clarke	1	0	8	9	41,726
Copiah	0	0	1	1	3,551
Forrest	0	0	4	4	40,050
Franklin	1	0	11	12	86,263
Green	0	0	2	2	21,735
Hancock	1	0	4	5	55,190
Harrison	0	0	1	1	9,014
Hinds	0	0	3	3	22,702
Issaquena	1	0	5	6	30,098
Itawamba	0	0	1	1	1,668
Jasper	0	0	4	4	29,135
Jefferson	4	0	29	33	200,822
Jones	0	0	1	1	13,517
Lamar	0	0	2	2	19,161
Lauderdale	0	0	1	1	4,117
Lawrence	0	0	1	1	13,014
Leflore	0	0	1	1	4,952
Lincoln	0	0	1	1	11,005
Madison	0	0	3	3	22,393
Marion	0	0	1	1	9,781
Monroe	0	1	1	2	9,481
Panola	0	0	1	1	4,339
Pearl River	1	0	7	8	70,459
Perry	0	0	3	3	28,585
Pontotoc	0	0	1	1	2,960
Rankin	0	0	3	3	30,165
Simpson	0	0	1	1	13,118
Smith	0	0	7	7	78,989
Stone	0	0	2	2	23,122
Sunflower	0	0	1	1	5,360
Tippah	0	0	1	1	5,302
Warren	0	0	1	1	9,600
Wayne	1	0	8	9	48,483
Wilkinson	3	0	27	30	237,132
Yazoo	0	0	3	3	23,326
Total	*19	1	200	220	1,595,942

*Includes 1 condensate well.

MISSISSIPPI

Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Adams	29	0	35	64	393,273
Clarke	0	0	1	1	6,009
Forrest	16	1	5	22	145,885
Franklin	5	0	9	14	88,272
Hancock	2	0	2	4	46,702
Hinds	8	0	1	9	101,642
Jasper	9	3	4	16	105,126
Jefferson	5	0	13	18	116,085
Jefferson Davis	2	0	0	2	18,810
Jones	9	0	2	11	91,338
Lincoln	2	0	0	2	21,096
Madison	1	0	1	2	10,008
Pearl River	6	0	2	8	82,658
Smith	7	0	0	7	84,447
Wayne	10	0	3	13	85,447
Wilkinson	12	0	13	25	184,792

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BRADEN Winches

	Oil	Gas	Dry	Total	Footage
Yazoo	3	0	0	3	15,893
Total	*126	4	91	221	1,597,481

*Includes 18 condensate wells.

MONTANA

Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Big Horn	0	0	9	9	45,312
Blaine	0	0	14	14	66,066
Broadwater	0	0	1	1	3,250
Carbon	1	0	3	4	34,579
Carter	1	0	5	6	31,823
Cascade	0	0	2	2	7,259
Chouteau	0	0	3	3	6,412
Custer	0	0	4	4	30,406
Daniels	1	0	2	3	21,558
Dawson	0	0	1	1	11,000
Fallon	0	0	4	4	36,105
Fergus	0	0	8	8	18,947
Garfield	0	0	1	1	3,130
Glacier	0	0	3	3	10,868
Golden Valley	0	0	3	3	8,195
Hill	0	1	7	8	29,822
Judith Basin	0	0	1	1	3,950
McCone	0	0	1	1	9,500
Musselshell	2	0	13	15	61,769
Park	0	0	1	1	4,400
Petroleum	0	0	14	14	45,069
Phillips	0	0	2	2	9,042
Pondera	0	0	9	9	35,688
Powder River	0	0	11	11	38,526
Prairie	2	0	0	2	18,387
Rosebud	0	0	20	20	107,036
Roosevelt	1	0	2	3	20,591
Sheridan	0	0	1	1	7,290
Stillwater	0	0	4	4	25,400
Teton	1	0	9	10	39,653
Toole	0	0	8	8	22,810
Volley	0	0	6	6	37,382
Wheatland	0	0	3	3	11,708
Yellowstone	3	0	7	10	38,903
Total	12	1	182	195	891,836

MONTANA

Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Big Horn	6	0	0	6	14,521
Blaine	1	0	1	2	7,651
Carbon	2	1	1	4	35,666
Daniels	2	0	2	4	27,095
Dawson	8	0	0	8	72,879
Fallon	34	0	2	36	317,328
Glacier	22	1	9	32	94,907
Golden Valley	0	1	1	2	5,092
Hill	0	1	0	1	3,435
Liberty	3	0	1	4	10,866
Musselshell	9	0	4	13	47,872
Petroleum	0	0	1	1	1,217
Pondera	3	0	1	4	7,821
Powder River	0	1	4	5	15,952
Prairie	1	0	1	2	18,269
Roosevelt	26	0	5	31	196,039
Rosebud	2	0	2	4	19,395
Stillwater	1	0	1	2	6,487
Teton	18	0	7	25	57,367
Toole	31	1	21	53	105,917
Wibaux	35	0	2	37	344,178
Yellowstone	18	0	6	24	138,648
Total	222	6	72	300	1,548,602

WESTERN NEBRASKA

Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Banner	6	0	74	80	485,998
Arthur	0	0	1	1	3,299
Box Butte	0	0	8	8	28,680
Chase	0	0	4	4	20,654
Cheyenne	3	1	55	59	304,265
Custer	0	0	2	2	7,394
Davis	0	0	1	1	2,833
Dawes	0	0	3	3	11,178
Deuel	0	0	6	6	22,787
Frontier	0	0	1	1	4,250
Garden	1	0	14	15	54,978
Harlan	0	0	2	2	7,811
Hayes	0	0	2	2	9,196
Hitchcock	1	0	8	9	38,688
Keith	0	0	1	1	3,728
Kimball	22	0	139	161	1,031,240
Lincoln	0	0	1	1	4,292
McPherson	0	0	1	1	3,148
Morrill	4	0	37	41	184,835
Perkins	0	0	3	3	11,237
Red Willow	1	0	9	10	39,813
Scotts Bluff	0	0	12	12	65,140
Sioux	0	0	4	4	22,175
Total	38	1	388	427	2,367,619

WESTERN NEBRASKA

Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Banner	75	0	41	116	680,516
Cheyenne	42	0	32	74	371,696
Garden	0	0	3	3	10,296
Harlan	1	0	0	1	3,698
Hitchcock	0	0	1	1	4,216
Kimball	128	0	112	240	1,548,748
Morrill	14	0	6	20	102,166
Red Willow	1	0	0	1	3,919
Total	261	0	195	456	2,725,255

NORTHWEST NEW MEXICO

Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
McKinley	0	0	24	24	52,723

1956 Wildcat and field drilling

	Oil	Gas	Dry	Total	Footage
Rio Arriba	1	7	4	12	70,981
Sandoval	1	0	12	13	56,168
San Juan	12	1	43	56	257,998
San Miguel	0	0	1	1	3,226
Total	14	8	84	106	441,096

NORTHWEST NEW MEXICO

Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Rio Arriba	0	301	19	320	1,351,698
Sandoval	2	3	0	5	19,200
San Juan	70	318	31	419	1,462,296
Total	72	622	50	744	2,833,194

SOUTHEAST NEW MEXICO

Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Chaves	3	0	24	27	74,464

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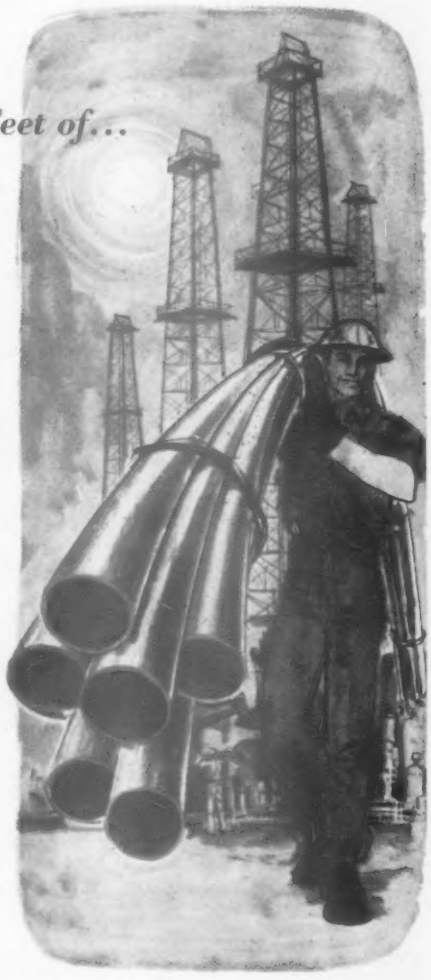

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1956 Wildcat and field drilling

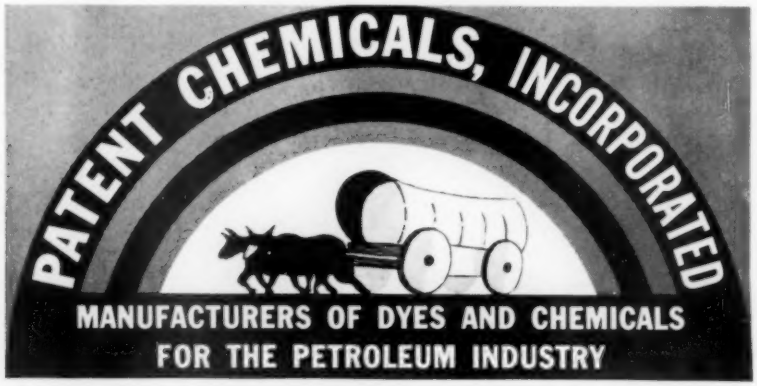
	Oil	Gas	Dry	Total	Footage
Curry	0	0	2	2	11,233
Eddy	11	2	43	56	179,779
Guadalupe	0	0	2	2	8,185
Lea	27	0	56	83	780,743
Roosevelt	1	0	1	2	24,502
Total	42	2	123	172	1,078,906

SOUTHEAST NEW MEXICO
Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Chaves	82	0	14	96	287,182
Eddy	158	1	32	191	451,712
Lea	493	41	61	595	3,366,687
Total	733	42	107	882	4,105,581

NORTH DAKOTA
Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Bottineau	1	0	24	25	99,223
Burke	1	0	11	12	76,659
Cavalier	0	0	1	1	2,270
Divide	1	0	1	2	14,845
Dunn	0	0	1	1	9,207
Eddy	0	0	3	3	7,609
Foster	0	0	7	7	19,592
McHenry	0	0	1	1	4,545
McKenzie	3	0	5	8	79,925
McLean	0	0	1	1	8,650
Mountrail	0	0	1	1	7,704
Renville	0	0	8	8	41,923
Ward	0	0	4	4	24,094
Wells	0	0	1	1	4,395
Williams	2	0	1	3	30,817
Total	8	0	70	78	431,458



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NORTH DAKOTA
Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Bottineau	10	0	3	13	48,364
Burke	0	0	2	2	14,248
McKenzie	68	0	10	78	743,880
Mountrail	14	0	2	16	130,303
Renville	1	0	2	3	14,401
Williams	63	0	10	73	594,517
Total	156	0	29	185	1,545,713

OHIO
Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Coshocton	0	2	0	2	7,114
Holmes	0	0	2	2	8,381
Muskingum	0	1	0	1	3,913
Noble	0	0	1	1	5,686
Perry	1	1	0	2	6,250
Shelby	0	0	1	1	3,196
Washington	0	0	2	2	7,933
Wayne	1	1	0	2	7,418
Total	2	5	6	13	49,891

OHIO
Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Ashland	51	3	50	104	100,823
Athens	5	24	11	40	50,099
Belmont	0	0	1	1	1,279
Coshocton	82	10	23	115	396,291
Cuyahoga	0	4	0	4	10,286
Fairfield	3	0	3	6	15,186
Gallia	2	0	1	3	4,983
Guernsey	5	2	11	18	27,320
Hocking	22	9	20	51	142,178
Harrison	0	0	3	3	2,947
Holmes	34	11	18	63	220,909
Jackson	0	3	0	3	2,322
Knox	32	11	11	54	156,412
Licking	112	6	27	145	364,267
Loraine	3	2	6	11	26,747
Medina	9	9	2	20	64,309
Meigs	8	16	8	32	44,196
Monroe	8	3	11	22	44,958
Morgan	0	14	11	25	29,779
Muskingum	64	6	24	94	261,647
Noble	2	6	25	33	43,381
Perry	38	7	14	59	170,440
Portage	1	0	0	1	4,178
Richland	0	0	2	2	5,080
Stork	2	6	1	9	36,952
Summit	4	1	1	6	20,491
Tuscarawas	26	5	12	43	56,897
Washington	27	7	24	58	64,903
Wayne	30	8	10	48	163,559
Total	570	173	*330	1,073	2,532,819

*Incl. 54 service wells.

OKLAHOMA
Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Alfalfa	4	0	14	18	109,657
Atoka	0	0	7	7	13,536
Beaver	8	17	9	34	244,773
Beckham	1	1	6	8	28,354
Blaine	0	0	2	2	15,179
Bryan	1	0	8	9	54,229
Caddo	7	2	10	19	135,426
Canadian	1	1	2	4	35,877
Carter	6	0	12	18	122,775
Cherokee	0	0	4	4	2,763
Choctaw	0	0	2	2	1,867
Cimarron	1	0	6	7	37,977
Cleveland	3	0	16	19	147,295
Coal	0	0	8	8	34,123
Comanche	1	0	20	21	33,876
Cotton	0	0	13	13	24,113
Craig	1	0	2	3	1,242
Creek	4	1	10	15	42,704
Delaware	0	0	2	2	800
Garfield	3	0	16	19	87,374
Garvin	12	0	16	28	163,061
Grady	3	0	6	11	122,662
Grant	11	1	28	40	214,701
Greer	0	0	9	9	16,601
Harmon	0	0	1	1	6,708
Harper	4	3	5	12	80,219
Hughes	1	4	7	12	24,885
Jackson	0	0	7	7	27,641
Jefferson	1	0	24	25	85,591
Johnston	0	0	2	2	5,475
Kay	3	0	24	27	102,054
Kingfisher	3	0	1	4	30,456
Kiowa	3	0	29	32	35,156
Leflore	0	0	3	3	6,556

	Oil	Gas	Dry	Total	Footage
Lincoln	4	0	25	29	128,856
Logan	1	0	23	24	135,460
Love	1	0	3	4	16,511
McClain	6	1	7	14	124,177
McCurtain	0	0	1	1	2,900
McIntosh	0	1	1	2	2,553
Marshall	2	0	4	6	37,567
Mayes	0	0	1	1	865
Murray	0	0	18	18	72,566
Muskogee	0	0	2	2	4,211
Noble	6	0	15	21	101,999
Oklahoma	2	0	10	12	78,653
Okfuskee	2	1	8	11	36,973
Osage	16	2	79	97	275,862
Ottawa	0	0	1	1	850
Pawnee	0	0	34	34	83,412
Payne	8	0	17	25	102,813
Pittsburg	0	0	3	3	3,569
Pontotoc	0	0	12	12	31,851
Pottawatomie	3	0	14	17	83,407
Pushmataha	0	0	1	1	2,000
Rogers	0	0	1	1	740
Seminole	2	0	6	8	26,830
Sequoyah	0	0	3	3	8,709
Stephens	5	0	14	19	145,732
Texas	5	2	9	16	98,777
Tillman	8	0	23	31	157,252
Washita	0	0	2	2	21,157
Woods	1	2	2	5	32,696
Woodward	0	0	2	2	21,348
Total	*154	41	672	867	3,936,002

*24 dist.

OKLAHOMA

Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Alfalfa	19	1	3	23	122,140
Atoka	0	0	1	1	734
Beaver	36	27	18	81	558,829
Beckham	6	3	8	17	30,015
Caddo	163	2	44	209	586,019
Canadian	0	0	1	1	8,326
Carter	297	8	81	386	1,625,171
Cimarron	5	15	3	23	101,788
Cleveland	160	0	21	181	1,420,633
Coal	11	0	6	17	45,225
Comanche	56	8	51	115	110,332
Cotton	7	0	13	20	37,607
Creek	382	10	189	581	1,396,009
Delaware	1	0	0	1	2,215
Garfield	70	1	43	114	389,360
Garvin	316	3	82	401	2,544,523
Grady	84	9	26	119	786,633
Grant	39	4	9	52	262,606
Greer	14	0	18	32	33,355
Harper	12	5	0	17	115,269
Haskell	0	1	0	1	6,128
Hughes	77	53	63	195	427,169
Jackson	7	0	8	15	26,731
Jefferson	13	0	26	39	76,983
Johnston	0	0	1	1	1,226
Kay	98	3	55	156	533,127
Kingfisher	4	0	2	6	39,287
Kiowa	29	2	34	65	45,980
Leflore	0	1	1	2	13,345
Lincoln	177	18	81	276	1,006,024
Logan	113	4	35	152	762,935
Love	27	0	11	38	183,986
McClain	16	0	11	27	260,426
McCurtain	0	0	1	1	1,215
McIntosh	0	0	1	1	4,980
Marshall	58	1	21	80	327,662
Murray	2	0	2	4	37,066
Muskogee	8	0	12	20	39,544
Noble	93	5	55	153	620,183
Nowata	2	0	2	4	3,200
Okfuskee	105	9	69	183	327,838
Oklahoma	37	1	17	55	320,932
Okmulgee	184	7	183	374	635,641
Osage	1,015	3	411	1,429	3,299,179
Pawnee	98	1	72	171	444,939
Payne	132	8	78	218	753,751
Pontotoc	111	6	72	189	293,214
Pottawatomie	54	1	47	102	395,544
Rogers	14	0	11	25	22,908
Seminole	143	1	69	213	665,967
Stephens	265	15	103	383	1,321,644
Texas	9	38	10	57	354,700
Tillman	60	0	24	84	284,572
Tulsa	28	0	8	36	55,858
Wagoner	8	0	21	29	30,585
Washington	1	0	1	2	2,839
Washita	3	1	2	6	40,797
Woods	2	3	1	6	40,462
Total	4,671	280	†2,238	7,189	23,885,306

†Incl. 434 service wells.

SOUTH DAKOTA

Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Butte	0	0	1	1	4,533
Harding	0	0	4	4	27,205
Jackson	0	0	1	1	4,780
Tripp	0	0	3	3	11,665
Total	0	0	9	9	48,183

SOUTHWEST TEXAS

District 1

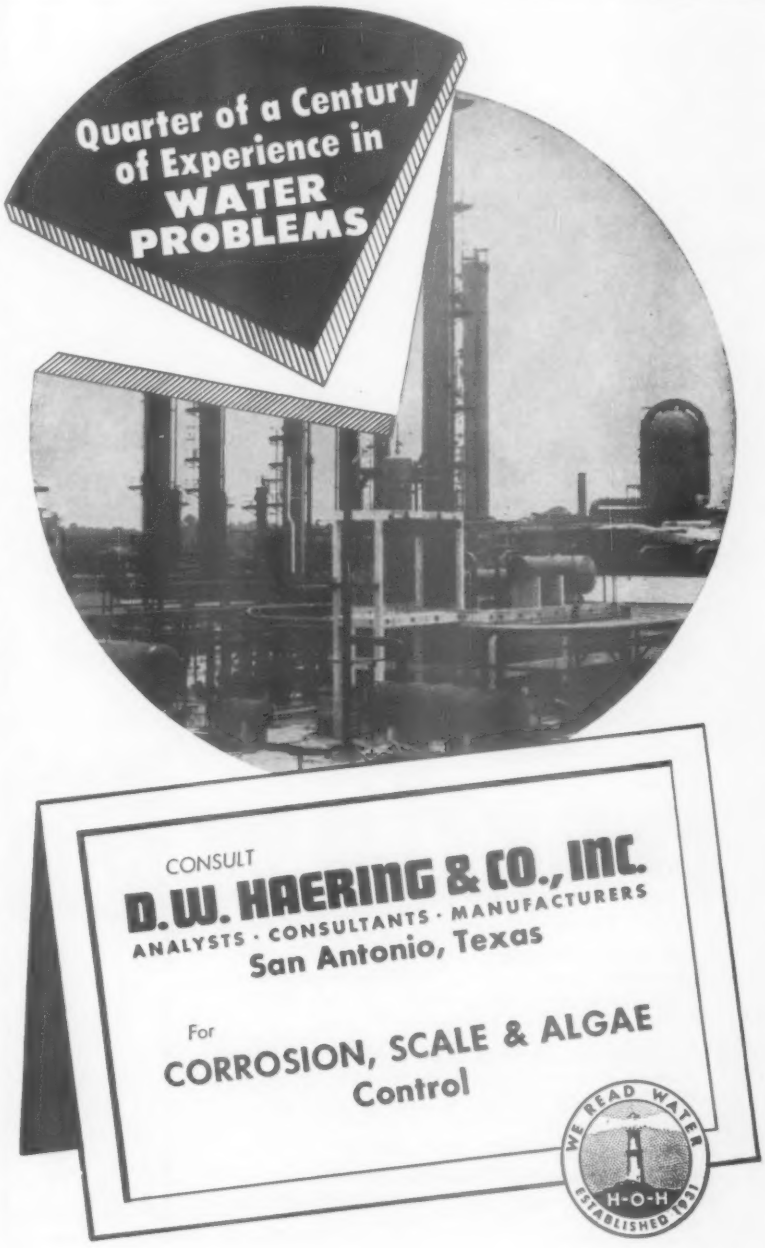
Wildcat Completions by Counties

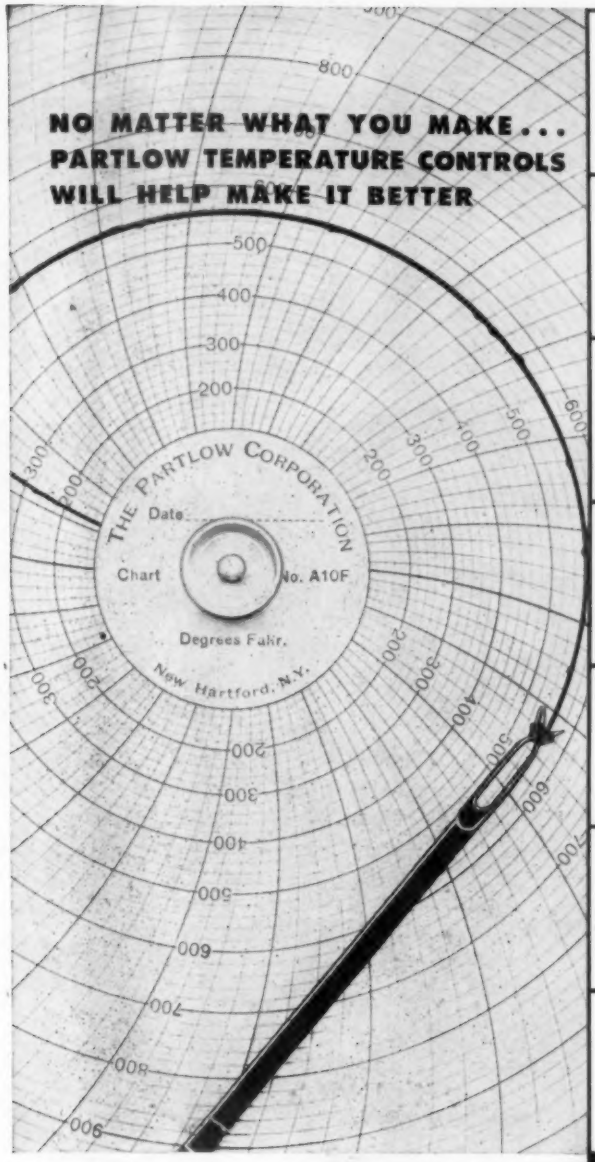
	Oil	Gas	Dry	Total	Footage
Atascosa	4	2	63	69	224,917
Bandera	0	0	1	1	1,100
Bastrop	2	0	12	14	38,729
Bell	0	0	5	5	14,600
Bexar	6	0	19	25	37,431
Blanco	0	0	1	1	1,440
Burnett	0	0	3	3	13,214
Caldwell	3	0	14	17	42,654
Dimmit	6	3	34	43	134,712

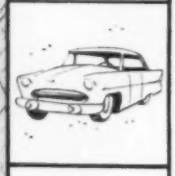
1956 Wildcat and field drilling

	Oil	Gas	Dry	Total	Footage
Edwards	0	0	2	2	14,380
Frio	2	0	28	30	122,889
Gonzales	0	0	25	25	100,394
Guadalupe	1	0	28	29	60,612
Hayes	0	0	2	2	5,495
Kinney	0	0	1	1	2,673
LaSalle	4	1	15	20	131,689
Mason	0	0	1	1	146
Maverick	1	0	18	19	57,826
McMullen	4	4	29	37	173,761
Medina	0	0	20	20	31,081
Milam	0	0	2	2	9,243
Travis	0	0	24	24	17,439
Val Verde	0	1	7	8	49,971
Williamson	0	0	8	8	15,740
Wilson	6	0	74	80	216,497
Zavala	0	1	11	12	44,609
Total	*39	12	447	498	1,564,042

*Includes 2 condensate wells.







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Offices in All Principal Cities

1956 Wildcat and field drilling

SOUTHWEST TEXAS

District 1

Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Atascosa	226	0	24	250	1,040,631
Bastrop	10	0	5	15	35,208
Bexar	117	0	21	138	183,798
Caldwell	114	0	7	121	289,613
Dimmit	25	0	16	41	120,973
Edwards	0	0	1	1	2,500
Frio	45	0	11	56	223,683
Gonzales	0	0	1	1	3,371
Guadalupe	88	0	5	93	156,846
LaSalle	38	0	9	47	44,785
Maverick	2	0	4	6	14,409
McMullen	8	5	10	23	129,870
Medina	95	0	11	106	89,519
Milam	11	0	7	18	21,705
Travis	1	0	7	8	6,545
Val Verde	0	1	2	3	34,110
Wilson	147	0	29	176	422,549
Zavala	1	1	0	2	8,371
Total	928	7	170	1,105	2,828,486

TEXAS GULF COAST

District 2

Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Bee	5	12	38	55	272,832
Calhoun	2	0	15	17	131,405
DeWitt	4	2	21	27	200,796
Goliad	2	2	30	34	187,291
Jackson	3	4	49	56	418,795
Karnes	1	0	23	24	124,882
Lavaca	0	1	7	8	70,211
Live Oak	7	4	46	57	283,762
Refugio	2	1	10	13	93,408
Victoria	2	3	12	17	96,060
Total	*28	29	251	308	1,879,442

*Includes 4 condensate wells.

TEXAS GULF COAST

District 2

Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Bee	15	14	10	39	197,219
Calhoun	54	15	16	85	699,486
DeWitt	11	4	2	17	155,756
Goliad	20	15	21	56	318,587
Jackson	20	7	16	43	293,187
Karnes	19	0	4	23	98,392
Lavaca	6	4	4	14	94,838
Live Oak	43	11	17	71	303,599
Refugio	51	14	13	78	460,284
Victoria	15	22	6	43	263,873
Total	*254	106	109	469	2,885,221

*Includes 14 condensate wells.

TEXAS GULF COAST

District 3

Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Austin	1	0	3	4	23,595
Brazoria	4	4	36	44	409,244
Brazos	0	1	2	3	16,147
Burleson	0	0	2	2	3,830
Chambers	7	6	19	32	311,942
Colorado	4	4	6	14	133,906
Fayette	1	0	5	6	26,874
Fort Bend	6	3	35	44	359,446
Galveston	2	4	18	24	240,903
Grimes	0	0	1	1	4,326
Hardin	0	1	8	9	82,705
Harris	7	4	87	98	733,693
Jasper	3	1	11	15	125,195
Jefferson	2	4	36	42	400,010
Liberty	4	1	33	38	335,432
Matagorda	5	7	58	70	489,553
Montgomery	1	3	22	26	195,009
Newton	3	1	12	16	133,581
Orange	1	0	16	17	173,077
Polk	0	1	2	3	15,016
San Jacinto	0	0	8	8	55,365
Tyler	1	0	3	4	37,576
Walker	0	1	1	2	5,600
Waller	0	0	6	6	45,901
Wharton	1	5	29	35	189,225
Total	*53	51	458	562	4,547,251

*Includes 12 condensate wells.

TEXAS GULF COAST

District 3

Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Austin	13	1	6	20	111,001
Brazoria	60	3	36	99	577,231
Chambers	29	9	13	51	438,838
Colorado	26	13	7	46	440,393
Fayette	2	0	0	2	4,204
Fort Bend	33	2	27	62	375,058
Galveston	48	7	8	63	490,431
Hardin	107	1	19	127	329,672
Harris	295	14	66	375	2,461,623
Jasper	3	2	1	6	41,124
Jefferson	23	12	15	50	431,962
Liberty	157	4	33	194	1,388,459
Madison	1	1	0	2	17,950
Matagorda	27	12	31	70	423,996
Montgomery	7	1	7	15	88,988
Newton	4	1	2	7	51,829
Orange	22	1	4	27	138,029
Polk	1	0	0	1	4,900
Tyler	2	0	2	4	31,976
Waller	1	0	2	3	15,016
Washington	1	0	1	2	16,439
Wharton	22	15	23	60	266,186
Total	*884	99	303	1,286	8,139,578

*Includes 24 condensate wells

SOUTHWEST TEXAS

District 4

Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Aransas	3	1	8	12	111,336
Brooks	7	1	21	29	197,664
Cameron	0	0	6	6	71,456
Duval	7	7	61	75	371,629
Hidalgo	0	12	15	27	240,820
Jim Hogg	4	1	38	43	166,326
Jim Wells	10	7	40	57	328,357
Kenedy	4	1	3	8	76,848
Kleberg	4	2	6	12	117,255
Nueces	12	8	65	85	593,880
San Patricio	19	6	60	85	546,449
Starr	8	5	53	66	242,257
Webb	2	2	37	41	134,558
Willacy	6	1	3	10	83,753
Zapata	3	2	37	42	92,533
Total	*89	56	453	598	3,375,121

*Includes 4 condensate wells

SOUTHWEST TEXAS

District 4

Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Aransas	6	2	4	12	99,267
Brooks	12	4	7	23	143,357
Cameron	0	0	1	1	9,816
Duval	116	14	44	174	586,440
Hidalgo	7	41	13	61	480,085
Jim Hogg	49	0	6	55	148,583
Jim Wells	18	23	12	53	276,047
Kenedy	2	1	2	5	48,162
Kleberg	9	5	5	19	162,347
Nueces	58	30	30	118	761,730
San Patricio	81	12	25	118	729,000
Starr	74	25	45	144	675,295
Webb	16	2	17	35	91,436
Willacy	15	0	6	21	156,255
Zapata	29	2	7	38	88,757
Total	*492	161	224	877	4,456,577

*Includes 13 condensate wells

EAST TEXAS

Districts 5 and 6

Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Anderson	7	0	38	45	255,792
Angelina	0	2	4	6	33,284
Bosque	0	0	2	2	9,979
Bowie	0	0	4	4	17,904
Camp	0	0	4	4	17,051
Cass	2	0	5	7	47,793
Cherokee	1	2	53	56	292,440
Collin	0	0	1	1	4,219
Delta	0	0	1	1	6,000
Ellis	0	0	3	3	4,217
Falls	0	0	1	1	783
Fannin	0	0	1	1	3,854
Franklin	0	0	6	6	39,501
Freestone	0	0	7	7	44,356
Gregg	0	0	2	2	15,607
Harrison	0	1	4	5	30,975
Henderson	0	0	26	26	120,389
Hill	0	0	3	3	3,987
Hopkins	0	0	5	5	34,994
Houston	0	0	11	11	75,482
Hunt	0	0	7	7	36,217
Kaufman	0	0	21	21	82,317
Lamar	0	0	3	3	6,612
Leon	0	0	8	8	57,149
Limestone	1	0	22	23	75,997
Marion	1	0	12	13	83,532
McLennan	0	0	5	5	6,307
Morris	0	0	1	1	5,337
Nacogdoches	0	0	2	2	15,760
Navarro	0	0	25	25	67,002
Red River	3	0	20	23	53,105
Robertson	0	0	1	1	2,302
Rusk	1	2	13	16	84,863
Sabine	0	0	2	2	8,278
San Augustine	0	0	2	2	17,638
Shelby	0	1	13	14	66,782
Smith	1	0	19	20	123,683
Tarrant	0	0	2	2	4,605
Titus	1	0	5	6	37,745
Upshur	0	0	6	6	25,559
Van Zandt	0	0	15	15	67,062
Wood	2	0	18	20	142,074
Total	*20	8	403	431	2,128,533

*Oil wells include 3 distillate.

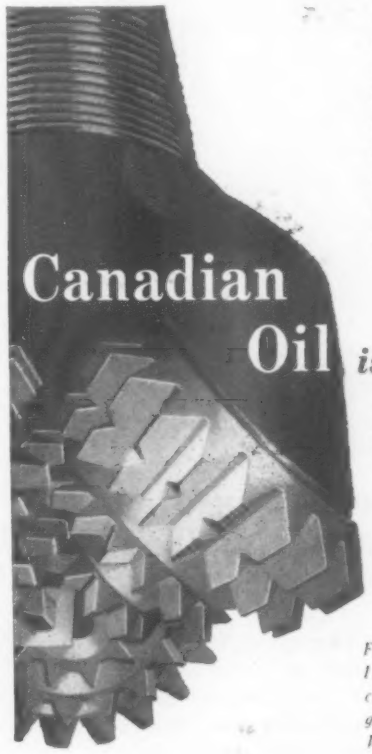
EAST TEXAS

Districts 5 and 6

Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Anderson	48	1	32	81	454,622
Angelina	0	1	2	3	22,549
Camp	1	0	0	1	3,903
Cass	81	0	5	86	532,873
Cherokee	26	2	10	38	182,237
Ellis	2	0	0	2	1,364
Falls	0	0	1	1	1,100
Franklin	2	1	1	4	42,815
Freestone	0	1	7	8	27,152
Gregg	5	7	5	17	121,047

1956 Wildcat and field drilling



Western Canada is the second most active drilling area in the world today, and in 1955 drilling hit an all-time high. The total number of wells drilled was approximately 2,700, an increase of about 25% over 1954. Most experts look to a sizeable increase in drilling activity in Western Canada in 1956 and believe that drilling will probably continue at around 2,500 wells per year until 1960.

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1956 Wildcat and field drilling

	Oil	Gas	Dry	Total	Footage
Harrison	101	21	11	133	600,576
Henderson	2	1	3	6	35,525
Hopkins	2	0	0	2	9,157
Houston	2	5	3	10	55,666
Kaufman	0	0	1	1	3,265
Leon	0	6	1	7	44,806
Limestone	0	0	5	5	21,067
Marion	43	0	6	49	239,392
Nacogdoches	0	0	1	1	410
Navarro	7	0	10	17	24,140
Panola	62	22	15	99	536,526
Red River	1	0	3	4	10,096
Rusk	18	6	10	34	177,771
Smith	19	9	0	28	218,658
Titus	2	0	2	4	21,079
Van Zandt	22	0	15	37	49,701
Wood	19	0	5	24	115,587
Total	465	74	163	702	3,553,084

WEST CENTRAL TEXAS
District 7-B
Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Brown	1	0	22	23	33,390
Callahan	11	1	205	217	488,928
Coleman	7	0	74	81	199,676
Comanche	4	0	12	16	46,328
Eastland	6	0	29	35	94,114
Erath	0	0	4	4	16,639
Fisher	17	0	54	71	393,724
Haskell	10	0	41	51	241,385
Jones	17	0	80	97	331,377
Nolan	6	0	59	65	430,470
Palo Pinto	1	0	17	18	44,059
Parker	0	1	3	4	20,514
San Saba	0	0	2	2	4,409
Shackelford	14	0	78	92	249,213
Stephens	9	2	48	59	219,733
Stonewall	8	0	34	42	252,159
Taylor	23	0	108	131	441,506
Throckmorton	13	0	54	67	240,675
Total	147	4	924	1,075	3,748,299

WEST CENTRAL TEXAS
District 7-B
Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Brown	69	1	24	94	128,003
Callahan	156	0	88	244	511,409
Coleman	113	3	53	169	403,207
Comanche	1	1	1	3	7,570
Eastland	39	0	20	59	126,839
Fisher	93	0	16	109	507,799
Hamilton	0	0	1	1	2,910
Haskell	80	0	22	102	448,278
Jones	140	0	28	168	549,295
Nolan	217	2	32	251	1,595,654
Parker	0	1	0	1	5,450
Palo Pinto	18	0	5	23	45,957
Shackelford	185	0	61	246	328,711
Stephens	129	1	46	176	581,402
Stonewall	84	0	22	106	560,986
Taylor	147	0	40	187	591,457
Throckmorton	36	0	35	71	185,817
Total	1,507	9	494	2,010	6,580,744

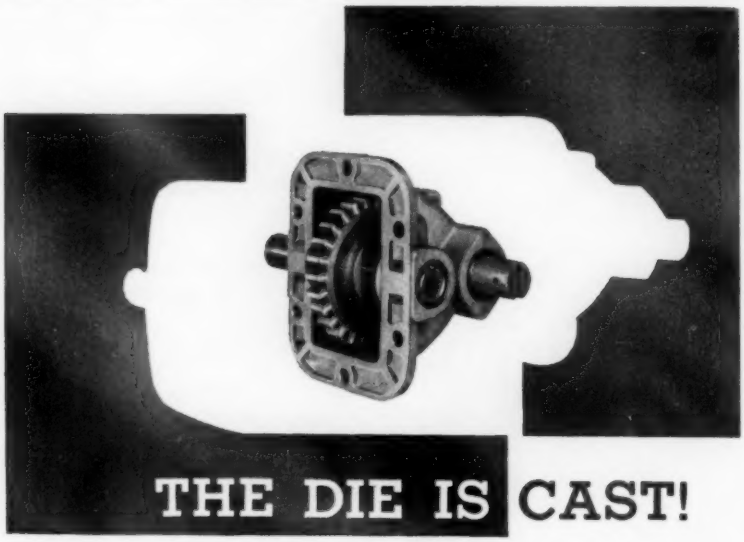
WEST TEXAS
Districts 8 and 7-C
Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Andrews	10	0	42	52	407,966
Borden	3	0	18	21	168,344
Brewster	0	0	3	3	23,589
Cochran	2	0	7	9	74,444
Coke	4	0	33	37	199,866
Concho	3	0	9	12	46,496
Cottle	0	0	2	2	13,769
Crane	12	0	19	31	167,423
Crockett	4	0	40	44	140,320
Crosby	1	0	3	4	26,057
Culberson	0	0	5	5	14,834
Dawson	7	0	17	24	212,158
Dickinson	0	0	1	1	7,195
Ector	23	0	21	44	404,600
Gaines	19	1	35	55	489,906
Garza	4	0	22	26	114,969
Glasscock	1	0	5	6	38,924
Hale	0	0	1	1	7,742
Hockley	2	0	8	10	86,228
Howard	1	0	16	17	90,287
Irion	14	0	35	49	278,792
Kent	1	0	18	19	137,557
Kimble	0	0	2	2	6,885
King	1	0	6	7	36,630
Lamb	0	0	5	5	23,615
Loving	1	0	4	5	34,552
Lubbock	0	0	6	6	47,290
Lynn	1	0	9	10	54,053
Martin	1	0	8	9	62,340
McCulloch	0	0	5	5	5,481
Menard	0	1	4	5	19,540
Midland	2	1	5	8	70,445
Mitchell	3	0	18	21	83,473
Pecos	6	2	31	39	223,800
Presidio	0	0	1	1	2,200
Reagan	5	0	13	18	78,459
Reeves	2	0	17	19	73,822
Runnels	8	1	58	67	274,934
Schleicher	0	1	16	17	105,142
Scurry	7	0	12	19	92,883
Sterling	2	0	11	13	70,716
Sutton	0	2	5	7	38,361
Terry	4	0	7	11	97,360
Tom Green	4	3	50	57	283,216
Upton	10	0	16	26	183,924
Ward	3	0	14	17	87,025
Winkler	5	2	6	13	114,930
Yoakum	4	0	15	19	163,165
Total	180	14	704	898	5,485,707

WEST TEXAS
Districts 8 and 7-C
Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Andrews	741	3	25	769	4,865,366
Borden	114	0	7	121	932,060
Cochran	24	0	3	27	139,708
Coke	17	0	7	24	149,252
Concho	1	1	1	3	10,052
Crane	505	2	13	520	2,125,381
Crockett	262	6	14	282	850,453
Crosby	2	0	0	2	7,602
Culberson	3	0	1	4	2,033
Dawson	68	0	3	71	426,663
Ector	463	0	9	472	2,677,183
Gaines	141	1	13	155	1,179,301
Garza	107	0	8	115	339,497
Glasscock	24	0	1	25	175,275
Hockley	19	0	2	21	174,385
Howard	275	0	11	286	860,525

(Continued on page 257)



THE DIE IS CAST!

IT'S THE DIE-CAST ALUMINUM HOUSING FOR THE NEW TULSA® SINGLE SPEED, MEDIUM DUTY POWER TAKE-OFF!

The die-cast aluminum housing makes this NEW TULSA power take-off "light as a feather" . . . gives it all the strength and durability for which the TULSA line is famous. Output shaft rotates on two needle bearings and is manufactured in three sizes—13/16", 7/8" and 15/16". It's available with either cable or lever control. Designed and built to cover the full market range of a thoroughly dependable, low priced, single speed power take-off for medium duty work. Same nationwide distribution and service as offered for the full TULSA line of power take-offs.

Tulsa Winch
TULSA, OKLAHOMA
DIVISION OF VICKERS Inc.

There's a "best" in almost everything. Cameron manufactures the world's best in drilling controls. Now is an excellent time to take stock of your drilling control equipment. Weed out and replace old and obsolete units. It is sound economy to protect your big investment with the best control equipment available.

For restricted space in low substructures, the Cameron "SS" is the most compact heavy-duty preventer available. Two sets of rams in the same body operate independently to assure a swift, safe closure. Practically all the unique features which have made Cameron preventers the universal choice of successful operators are found in the "SS."

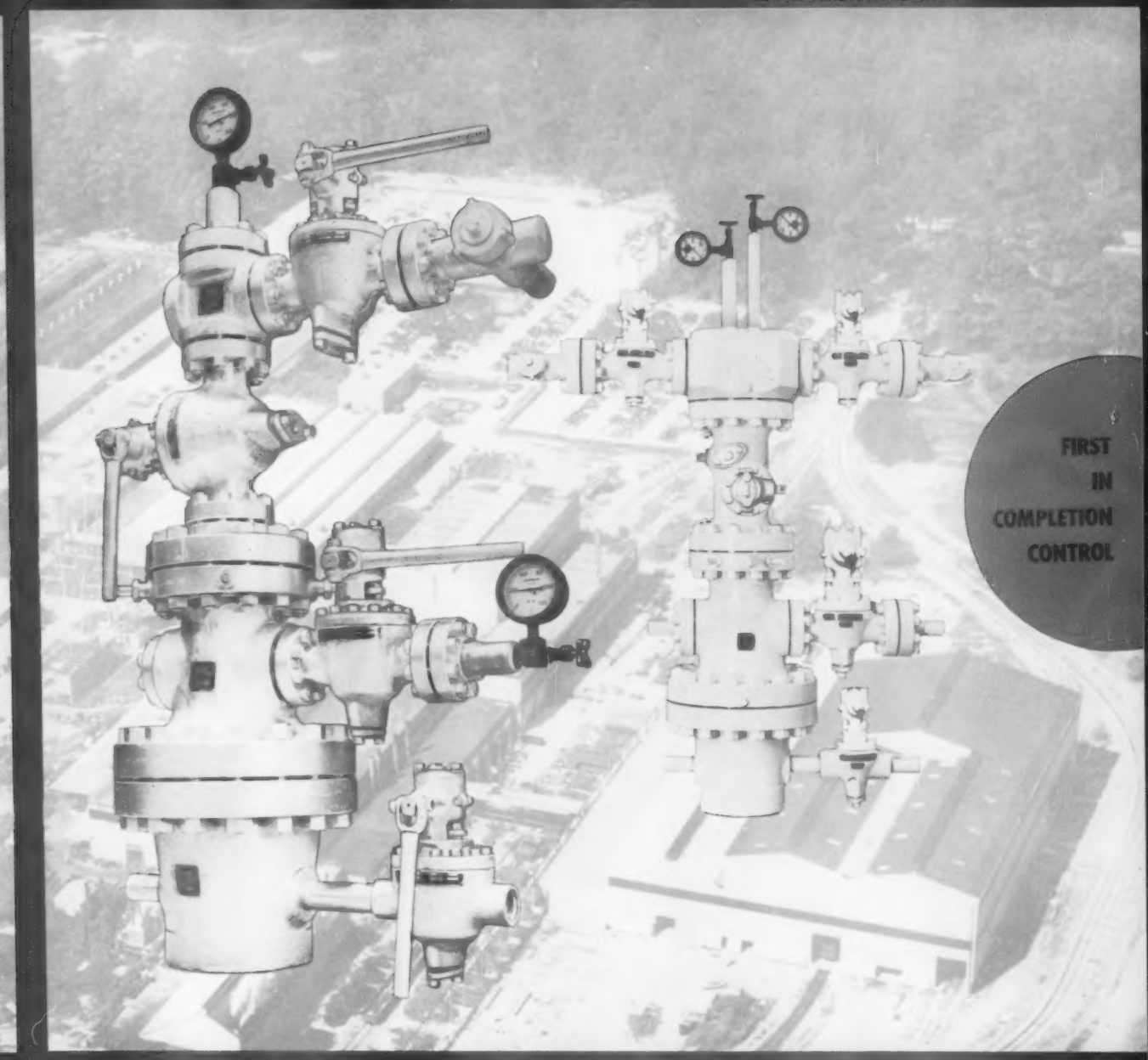
Cameron
IRON WORKS, Inc.

Where cellar space is no problem and drilling conditions are particularly hazardous, multiple "QRC" Blowout Preventer hook-ups are the standard of comparison – everywhere – for maximum protection.

Blowout prevention is a procedure. Make it a routine part of your drilling progress:

1. Be sure that your drilling control units are of adequate capacity to safely withstand the anticipated pressures.
2. Maintenance should begin *before* a new well is spudded, with careful internal inspection of each preventer. The importance of an operational test during every tour cannot be overstressed.
3. Crew members should not be allowed to become complacent to the ever-present danger of a blowout.

Cameron
IRON WORKS, Inc.



The control of production pressures and vital reserves is just as important as the control of pressures during a drilling operation. Cameron makes a complete range of parts for every tree requirement — single, dual or triple — for any depth or pressure. All of these components are manufactured in a variety of sizes and pressure ranges to meet every sub-surface situation. They may be assembled in different ways for different conditions. One consideration is personal choice. We like to remind ourselves that our trees are the choice of enough production people to make Cameron a byword in every oil producing area of the free world.

Cameron
IRON WORKS, Inc.

FIRST IN COMPLETION CONTROL

To stay in this enviable position, we maintain an alert engineering staff with first-hand field experience and testing laboratories designed specifically to anticipate and meet your needs. Our Houston plant is complete from melting of the steel through every phase of manufacture to shipping the finished assembly. Other plants, representatives and, of course, our products are found everywhere in oil producing areas. If your well needs a Christmas Tree (and we sincerely hope it does) call on Cameron for the world's finest.

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IRON WORKS, Inc.
P. O. Box 1212 — Houston, Texas
Export Office: 7912 Empire State Bldg., New York City. In England: Cameron Iron Works Ltd., Time & Life Bldg., New Bond Street, London W. 1 England

	Oil	Gas	Dry	Total	Footage
Irion	33	1	5	39	155,328
Kent	6	0	1	7	44,158
King	6	0	0	6	30,567
Kimble	0	2	0	2	2,518
Lamb	19	0	0	19	82,180
Loving	6	0	0	6	25,824
Lubbock	30	0	3	33	176,809
Lynn	12	0	3	15	65,029
Martin	2	0	2	4	41,846
Midland	90	0	3	93	990,903
Mitchell	177	0	11	188	459,274
Pecos	130	3	19	152	403,649
Reagan	164	0	2	166	931,796
Reeves	18	1	1	20	83,988
Runnels	125	0	23	148	619,528
Schleicher	27	0	3	30	155,007
Scurry	234	0	7	241	774,293
Sterling	16	0	2	18	77,737
Sutton	0	6	2	8	41,391
Terry	29	0	2	31	221,066
Tom Green	67	0	12	79	283,563
Upton	157	2	4	163	956,427
Ward	228	0	9	237	645,147
Winkler	133	1	2	136	572,651
Yoakum	70	0	1	71	422,959
Total	4,545	29	235	4,809	23,178,384

NORTH TEXAS
District 9
Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Archer	17	0	156	173	428,435
Baylor	8	0	91	99	217,191
Clay	19	0	62	81	397,814
Cooke	5	0	42	47	175,012
Denton	0	0	7	7	19,941
Foard	1	0	11	12	67,718
Grayson	19	0	38	57	399,415
Hardeman	0	0	3	3	22,903
Jack	15	5	69	89	312,653
Knox	21	0	111	132	327,119
Montague	11	0	34	45	253,720
Wichita	4	0	35	39	104,650
Wilbarger	9	0	107	116	365,376
Wise	16	3	9	28	154,547
Young	36	0	151	187	556,666
Total	181	8	926	1,115	3,803,160

NORTH TEXAS
District 9
Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Archer	291	0	275	566	978,302
Baylor	206	0	82	288	458,736
Clay	122	0	64	186	656,562
Cooke	104	0	50	154	419,725
Denton	4	1	2	7	12,411
Foard	9	0	6	15	69,050
Grayson	136	0	50	186	1,320,579
Jack	117	7	51	175	525,218
Knox	80	0	25	105	208,245
Montague	83	0	27	110	495,174
Wichita	546	0	150	696	1,465,627
Wilbarger	281	0	169	450	982,248
Wise	91	22	12	125	659,511
Young	227	1	163	391	1,009,733
Total	2,297	31	1,126	3,454	9,264,131

TEXAS PANHANDLE
District 10
Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Carson	0	1	1	2	7,380
Childress	0	0	1	1	6,590
Collingsworth	0	2	1	3	11,776
Dallam	0	0	3	3	9,642
Donley	0	0	1	1	6,959
Gray	0	1	5	6	55,161
Hansford	12	8	16	36	231,801
Hartley	0	0	3	3	20,237
Hemphill	0	0	1	1	4,460
Hutchinson	0	0	1	1	8,607
Lipscomb	1	0	6	7	67,613
Moore	0	0	2	2	9,862
Ochiltree	14	9	21	44	335,604
Randall	0	0	1	1	5,491
Roberts	1	2	7	10	65,321
Sherman	1	0	1	2	15,831
Wheeler	0	0	2	2	11,999
Total	*29	23	73	125	873,834

*Incl. 7 dist

TEXAS PANHANDLE
District 10
Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Carson	153	11	6	170	551,991
Collingsworth	0	5	2	7	18,052
Dallam	0	2	0	2	7,375
Gray	211	50	13	274	866,415
Hansford	23	21	14	58	376,794
Hartley	3	5	1	9	42,431
Hutchinson	463	8	7	478	1,538,338
Moore	4	11	3	18	63,616
Ochiltree	46	10	10	66	548,284
Potter	0	18	6	24	62,199
Roberts	6	3	5	14	82,240
Sherman	0	10	1	11	33,605
Wheeler	35	19	12	66	136,698
Total	944	173	80	1,197	4,328,038

UTAH
Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Box Elder	0	0	5	5	19,582
Carbon	1	0	3	4	11,524
Daggett	0	0	1	1	3,277

1956 Wildcat and field drilling

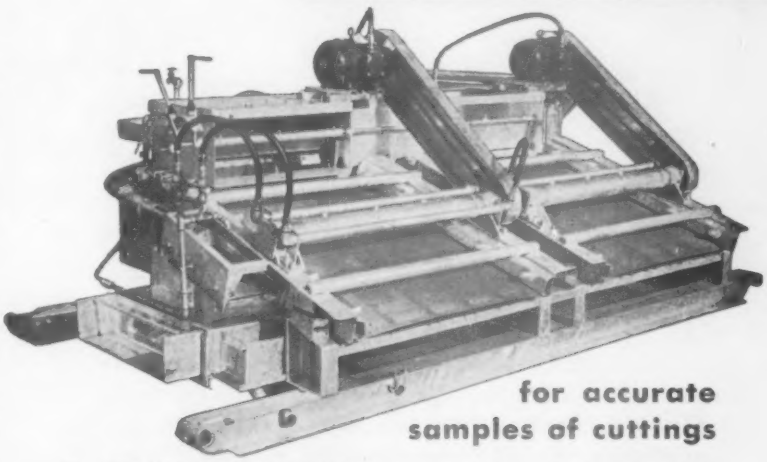
	Oil	Gas	Dry	Total	Footage
Duchesne	0	0	1	1	6,431
Emery	0	0	4	4	16,472
Garfield	0	0	1	1	4,303
Grand	0	1	19	20	61,185
Millard	0	0	1	1	4,218
San Juan	8	1	23	32	174,140
San Pete	0	1	1	2	16,914
Sevier	0	0	1	1	6,471
Tooele	0	0	1	1	2,950
Uintah	2	2	5	9	57,082
Utah	0	0	2	2	11,705
Wayne	0	0	2	2	11,474
Total	11	5	70	86	407,728

UTAH
Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Emery	0	3	0	3	18,673
Grand	0	7	7	14	42,583
San Juan	21	1	3	25	142,597

Thompson

DOUBLE VIBRATING SHALE SHAKER...and SAMPLE MACHINE



for accurate samples of cuttings

The THOMPSON SHALE SHAKER SAMPLE MACHINE offers the operator and geologist one of the best methods available for obtaining accurate foot-by-foot samples of well cuttings.

This THOMPSON DOUBLE VIBRATING SHALE SHAKER and SAMPLE MACHINE is specially engineered for off-shore barges or islands, deep wells, or wells using big volume and high pressure mud pumps. It is available either plain or galvanized, which makes it rust and deterioration-proof on off-shore or coastal duty

THOMPSON Shakers are famous for their highly efficient service at any depth or flow and for their economical first cost.

Make sure THOMPSON'S on the job for accurate samples and clean mud.

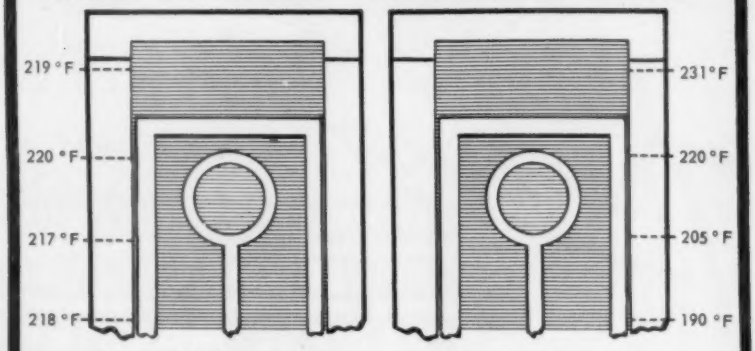
SOLD ONLY THROUGH SUPPLY STORES

Thompson TOOL CO. TOWA PARK, TEXAS

test proves . . .

ENGINE EQUIPPED WITH VAPOR PHASE

maintains UNIFORM OPERATING TEMPERATURE



Cylinder of engine cooled by **Vapor Phase.** Note temperature uniformity at all 4 thermocouple readings.

Cylinder of engine cooled by conventional means. Note temperature variation of 41°F.

The above temperature readings were made from thermocouples sealed in the cylinder metal at the points shown. The results graphically show the temperature uniformity throughout the cylinder length of the VAPOR PHASED engine, while the conventional cooling system ranged from 190°F. to 231°F.

WHAT DOES THIS MEAN TO YOUR ENGINE OPERATION?

The VAPOR PHASE system provides a trouble-free internal combustion engine cooling system that keeps the engine, or battery of engines, at a constant, uniform operating temperature at all times, regardless of engine speed or load.

This constant temperature control, as shown by installation after installation, improves combustion, minimizes cylinder wear and reduces lube oil sludging. It is, in fact, the "lowest cost" system in every way—in first cost, operating cost and maintenance cost.

WANT MORE INFORMATION? We'd like to tell about the many other advantages of VAPOR PHASING. For profitable facts write and tell us about your installation.

E C
VAPOR PHASE

ENGINEERING CONTROLS
Incorporated
AN AFFILIATE OF ST. LOUIS SHIPBUILDING & STEEL CO.

328 Paul Brown Bldg.
St. Louis 1, Mo.

1939 Hillhurst Ave.
Los Angeles 27, Calif.

1956 Wildcat and field drilling

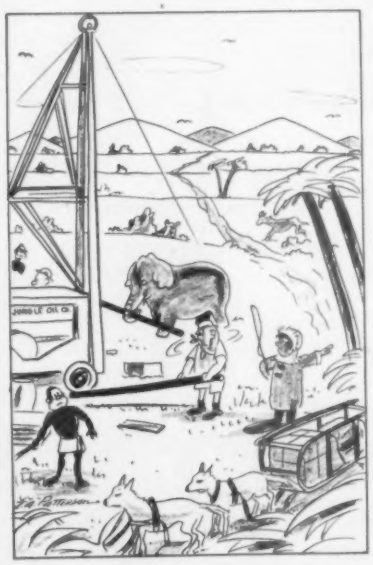
	Oil	Gas	Dry	Total	Footage
San Pete	0	1	0	1	7,262
Uintah	9	1	2	12	71,132
Total	30	13	12	55	282,247

WYOMING
Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Albany	0	0	1	1	3,540
Big Horn	1	1	20	22	84,691
Campbell	0	0	10	10	67,184
Carbon	0	1	11	12	49,632
Converse	2	0	8	10	42,114
Crook	3	0	13	16	39,770
Fremont	1	1	36	38	164,944
Goshen	0	0	13	13	81,641
Hot Springs	1	0	8	9	47,701
Johnson	1	0	14	15	63,694
Laramie	0	0	12	12	90,542
Lincoln	0	1	2	3	13,861
Natrona	5	2	39	46	156,649
Niobrara	1	0	10	11	25,647
Park	2	0	16	18	89,194
Platte	0	0	4	4	9,925
Sheridan	0	0	5	5	28,223
Sublette	0	1	5	6	45,046
Sweetwater	0	5	9	14	87,119
Uinta	0	0	1	1	10,800
Washakie	0	0	16	16	93,724
Weston	1	0	6	7	18,797
Total	18	12	259	289	1,314,438

WYOMING
Development Completions by Counties

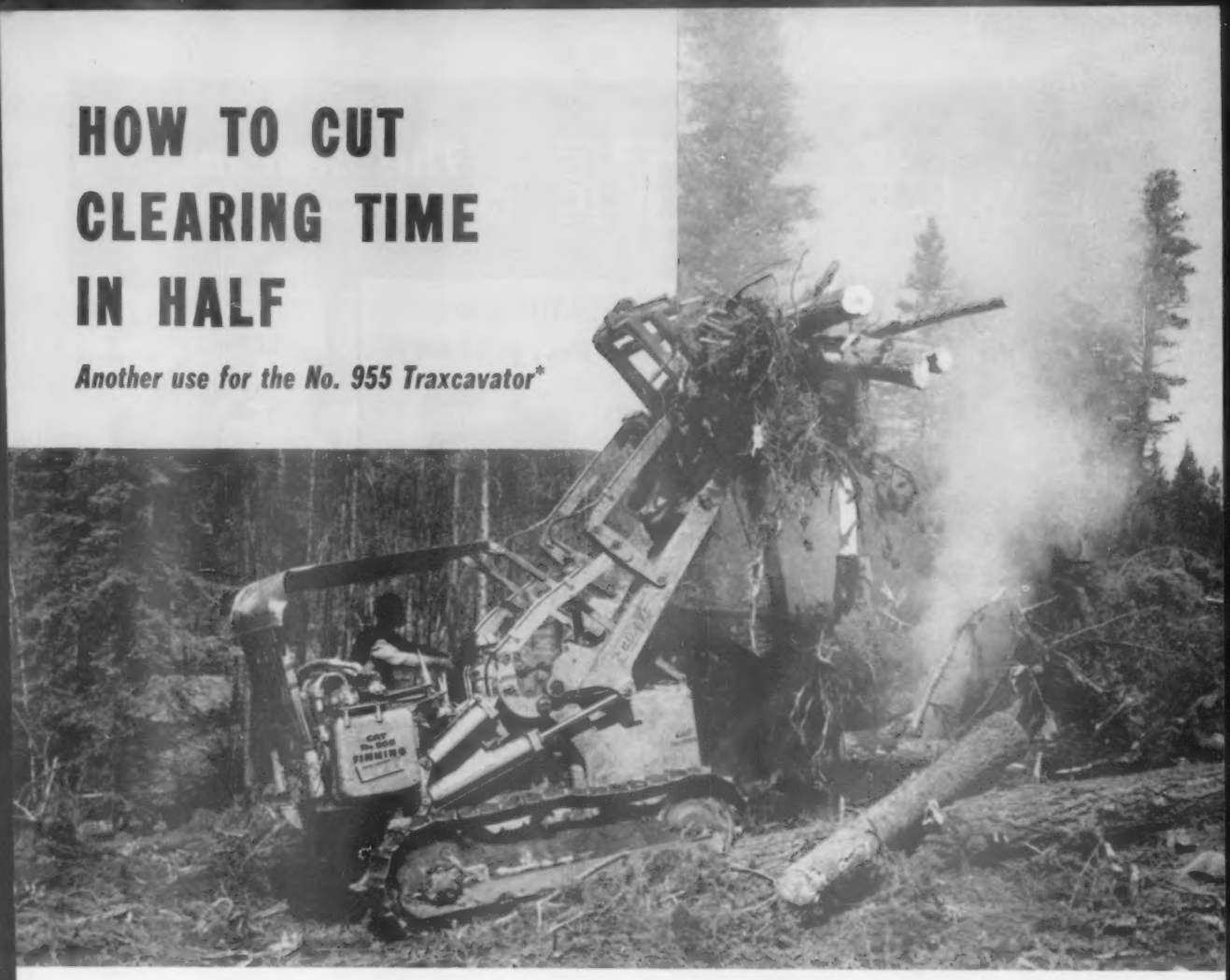
	Oil	Gas	Dry	Total	Footage
Albany	0	0	2	2	10,045
Big Horn	15	1	8	24	105,675
Campbell	1	0	0	1	6,316
Carbon	1	2	4	7	19,906
Converse	30	0	11	41	240,661
Crook	18	0	14	32	97,052
Fremont	44	1	6	51	251,791
Goshen	1	0	4	5	35,295
Hot Springs	50	0	8	58	231,775
Johnson	46	0	12	58	336,930
Laramie	3	0	4	7	55,054
Lincoln	3	0	1	4	4,846
Natrona	88	0	33	121	305,592
Niobrara	2	1	4	7	14,228
Park	22	3	6	31	174,346
Sheridan	0	0	1	1	4,676
Sublette	1	28	7	36	139,273
Sweetwater	1	2	4	7	35,653
Washakie	41	1	3	45	270,963
Weston	63	1	39	103	348,070
Total	430	40	171	641	2,652,147



"I'm sorry, I don't know—I'm a stranger here myself."

HOW TO CUT CLEARING TIME IN HALF

Another use for the No. 955 Traxcavator*



Conyes Construction Corp., San Pablo, Calif., is using six Caterpillar No. 955 Traxcavators to clear 210 miles of pipeline right-of-way in British Columbia. The company estimates that these Cat-built units *are cutting clearing time in half.* Here's how:

To cut a 60-foot-wide path through jack pine and fir, a D8 knocks down the trees. Everything over eight inches is salvaged by a crew. Then the No. 955s, equipped with alligator jaws operated with a hydraulic ram, pile the logs along the right-of-way and the remaining material on brush fires. The Traxcavators are even used to accelerate the fires. The units lift the top of the pile and use their blower-type engine fans to get a hot fire going quickly.

This method of clearing has enabled Conyes to average one-half to three-quarters of a mile per day in rough going—even working in 10 to 20 inches of snow!

The No. 955 is the newest Caterpillar-built equipment for pipeline spreads. Worked with alligator jaws, general purpose bucket, skeleton rock bucket, or bulldozer blades, this versatile unit enables you to pioneer roads, clear, backfill, build equipment sites and storage yards, and load trucks.

There are three sizes of Caterpillar-built Traxcavators—the No. 933, the No. 955 and the No. 977. They range in size from one-yard to 2¼-yard capacity, and, like all CAT* pipeline equipment, are designed to stay on the job.

Wherever the pipe takes you, you always are near fast, efficient Caterpillar service with factory parts that you can trust. So see your Caterpillar Dealer soon. He'll demonstrate these big, versatile machines on your job . . . at your convenience.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR*

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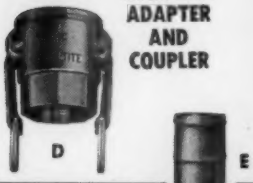
YOUR DEALER
WILL DEMONSTRATE**

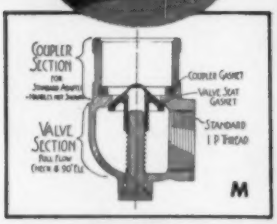
EVER-TITE The Best In Quick Couplings

EVER-TITE STANDARD ADAPTER AND COUPLER

EVER-TITE ADAPTER AND COUPLER

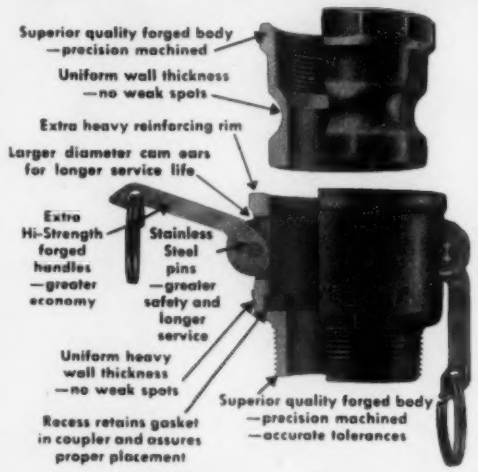


EVER-TITE SHANK HOSE COUPLING



EVER-TITE COUPLING ELBOW AND CHECK VALVE UNIT

Here is why EVER-TITE assures *speed... safety... economy*


Superior quality forged body —precision machined
Uniform wall thickness —no weak spots
Extra heavy reinforcing rim
Larger diameter cam ears for longer service life
Extra Hi-Strength forged handles —greater economy
Stainless Steel pins —greater safety and longer service
Uniform heavy wall thickness —no weak spots
Recess retains gasket in coupler and assures proper placement
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You save time in deliveries — and reduce wear and maintenance costs—when you use Ever-Tite Couplings. Ever-Tite gives you the finest in *quality* and *engineering*. And, Ever-Tite gives you *tight* connections every time — because every Ever-Tite has positive gasket compression that is dependable under *all* conditions. Get Ever-Tites — and get the best in quick couplings. There is an Ever-Tite for every need. Ask your distributor.

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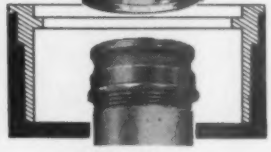
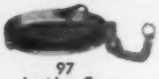
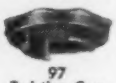


EVER-TITE "99" COUPLER with Sight Gauge



97 Locking Cap



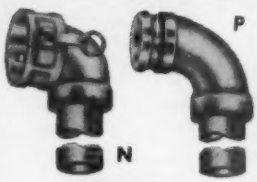
97 Twisting Cap

97 Adapter

No. 97 Ever-Tite Fill Cap

97 Adapters for Ever-Tite "99" Coupler

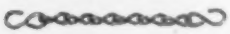
EVER-TITE ADAPTER AND COUPLER FOR TANK CAR UNLOADING



EVER-TITE 90° FULL-FLO ADAPTER AND COUPLER
Drop Tubes or Pipe Threads

Dust Plug Dust Cap

EVER-TITE DUST PROTECTORS



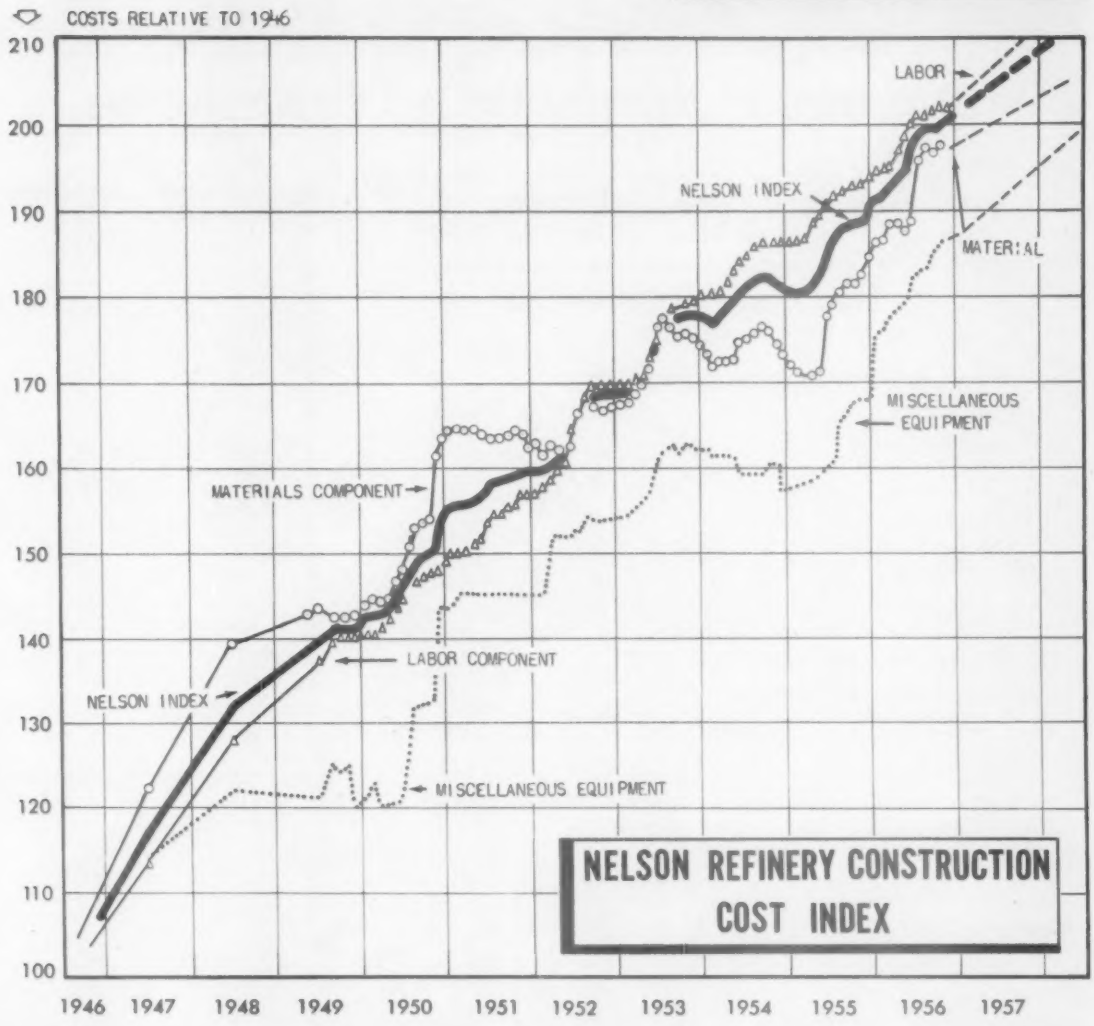
Chain for attaching Dust Caps or Dust Plugs to adapters or couplers

EVER-TITE SPOOL ADAPTER

EVER-TITE GASKETS

EVER-TITE HANDLES

EVER-TITE COUPLING CO. INC., 254 WEST 54TH STREET, NEW YORK 19, N. Y.



Refinery Construction Costs Are Rising Rapidly

by W. L. Nelson
Technical Editor

THE cost of refinery construction has continuously risen since 1946 except during early 1954 and again in early 1955. Material costs increased more rapidly than the cost of labor until mid-1952, but thereafter labor costs have been the main reason for advances.

The Korean war during 1950 caused the first sharp increase in material costs but later sharp increases have been precipitated by wage increases. It will be noted that wage increases during June-August 1952 preceded the general cost rise and likewise during May-August 1953. Steel workers' wages are not used directly in the Nelson Index, but the effect of increases of steel worker's wages is clearly evident in the cost of materials during June-August of 1953, 1954, 1955, and 1956.

Manufacturers of equipment and machinery (pumps, compressors, engines, instruments, heat exchangers, and electrical equipment) seem to have been able to overcome higher labor and raw-materials cost by improved management and design. Note the modest increases in the cost of miscellaneous equipment.

Barring such emergencies as severe curtailment of business, wars or political upheavals, it appears that refinery construction costs will rise throughout 1956-1958 to a value 110 per cent higher than in 1946. Although the cost of labor will continue to rise, only modest increases in the costs of materials are expected.

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for reforming, hydrogenation, and dehydrogenation

Houdry Platinum and Palladium Catalysts on hard alumina base are manufactured to obtain high, uniform hardness. They have proven process efficiency in all of the following processes:

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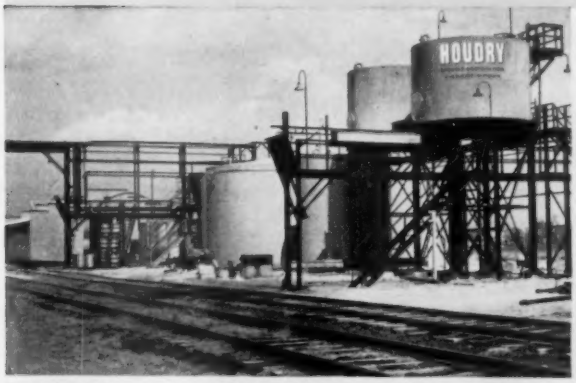
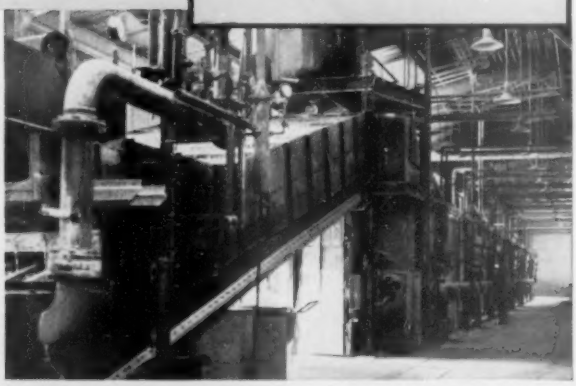
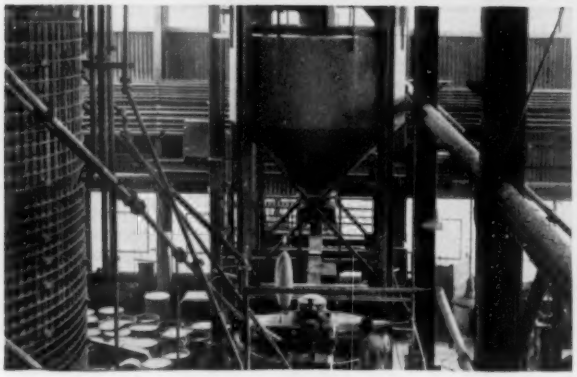
TYPICAL PROPERTIES

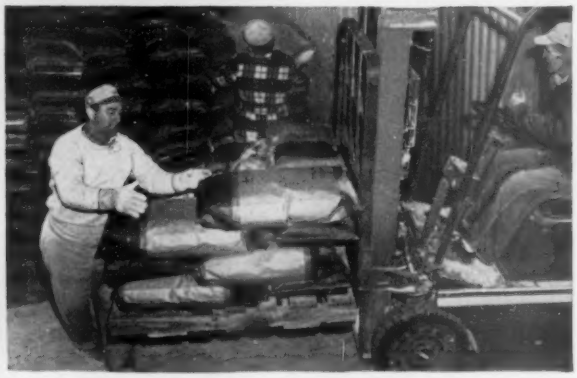
	PLATINUM CATALYSTS		PALLADIUM CATALYSTS	
SERIES	A	A	A	B
GRADE	100S	200SR	100SR	100S
Metal content, wt. %, nominal	0.5	0.5	5.0	0.5
Na_2O, wt. % min.	0.1	0.1	0.1	0.1
Surface Area, m^2/g.	80	145	125	80
Bulk Density, kg./l	0.84	0.84	0.88	0.86
Knife-edge Hardness, g.	5,000	7,900	4,500	4,500

Houdry Chemicals Division will manufacture pelleted type catalysts to specifications . . . and will also assist in developing catalysts for special requirements. Additional information will be sent on request.

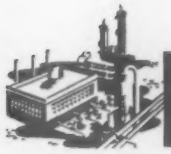








The Houdry Paulsboro, N. J., plant, built in 1940, was the first commercial plant in the world to produce synthetic cracking catalysts. In the past 16 years, facilities have been expanded to produce a general line of pelleted catalysts.



JOB IMPROVEMENT FOR THE PROCESS FOREMAN—77

Why Conductor Selection Is Important

THE effect of thermal resistance is illustrated in Fig. 1. The flow of heat is from the greater temperature T_1 to the smaller temperature T_2. From this illustration it can be seen that the temperature level steadily decreases because of the resistances offered by the tube wall, scales, and films.

Consider the effect of the stagnant film and how the thermal resistance offered by it can be reduced.

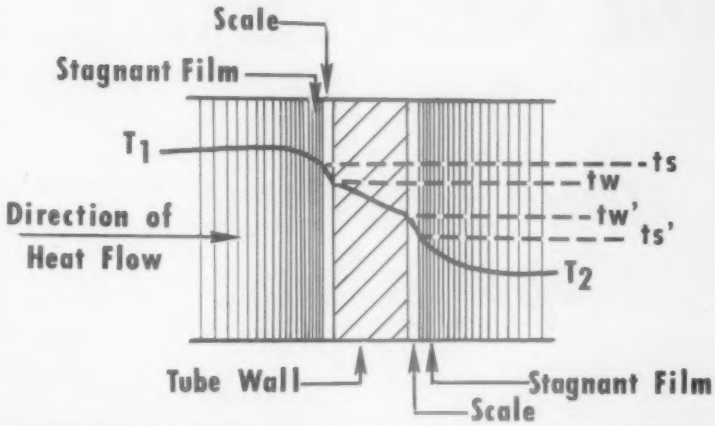
The flow of heat in the lighter portions of the drawing at points T_1 and T_2 is being accomplished by convection. However, as the tube wall is approached the effect of convection is steadily reduced until heat is transmitted through the stagnant fluid film by conduction almost exclusively.

Since liquids and gases are relatively poor conductors, the flow of heat is impeded. This type of transfer must be depended on, so steps must be taken to minimize its effect and devise a means to promote heat flow rather than impede it.

Conduction . . . As has been developed earlier, the transfer of heat by conduction is inversely proportional to the thickness of the material through which it flows. Herein lies the only means by which greater heat flow can be effected—by decreasing the stagnant film thickness.

This can be done by changing the speed or velocity at which the fluid is passing over the tube wall. Just as a river or a creek carries sand away from its bank, so can the fluid in or outside a tube cut into the stagnant film, reduce its thickness and, thereby, improve the ease of heat transfer through it.

This material is taken from "Fundamentals of Refining," operating manual of Magnolia Petroleum Co., refining division, Beaumont, Tex.



EFFECT of thermal resistance is shown here. The flow of heat is from the greater temperature T_1 to the smaller temperature T_2. Fig. 1.

After passing through the stagnant fluid film, heat encounters its second resistance — scale. Here, again, the mechanism is heat flow by conduction and since the scale is relatively porous it is a good insulator, not a conductor. There are no means of reducing the scale thickness with the fluid being heated or cooled. Steps must be taken to reduce the tendency of scale formation and periodically clean the tube surface. This is done during unit turnarounds.

Tube wall . . . There remains one resistance to be reckoned with—that offered by the tube wall. This resistance is very often negligible compared with resistance offered by the stagnant films and scales. However, if it should become of consequence, there are two means of reducing its magnitude. Heat flow through the tube wall is dependent upon conduction.

This means, again, that heat-transfer improvement can be accomplished by reducing the thickness of the impeding material. It is for this reason that thin-walled tubes are used in heat exchangers. Further, although all metals are good conductors, some are better than others. The selection of a good conductor for tube material can help to reduce this resistance.

As has been shown, the principle factors that influence heat flow are:

1. Temperature difference between the hot and cold fluids.

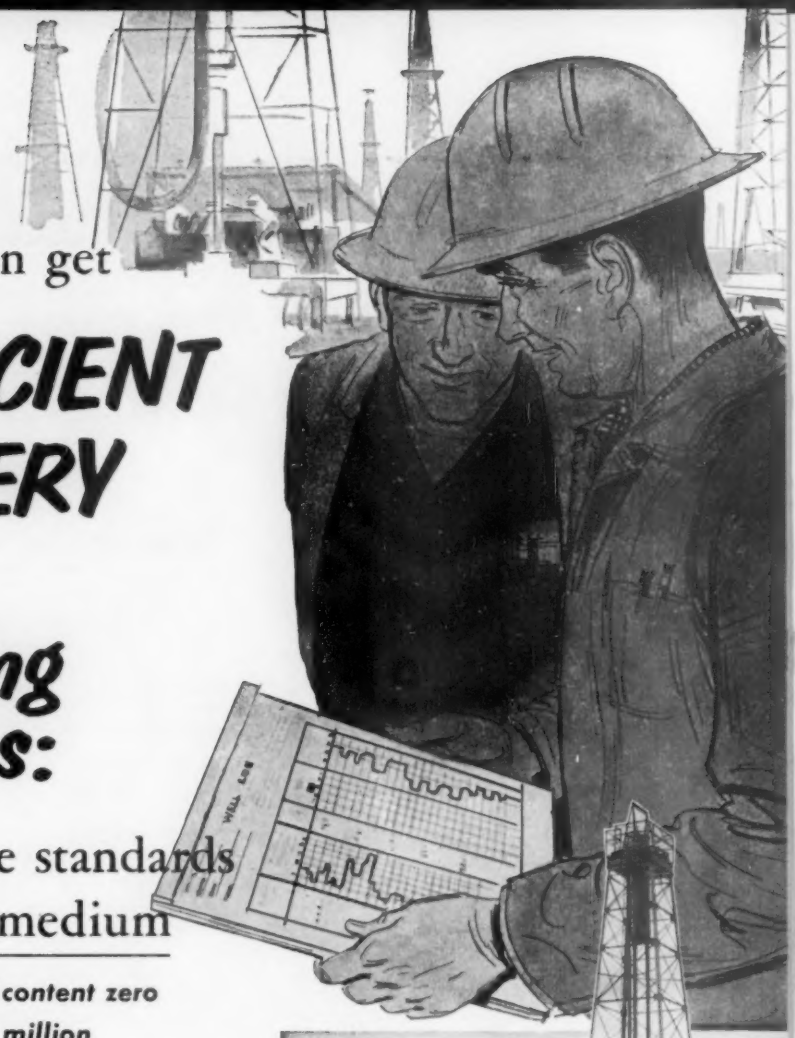
2. Velocity of the streams being heated or cooled.

3. The thickness of scale on the heat-transfer surface.

The transfer of heat through a tube wall is called indirect transfer. There is another method by which heat exchange can be accomplished without the benefit of transfer surface. This type of heating or cooling is called direct and is brought about by intermingling the hot and cold fluids. Examples of this direct heat exchange are cooling towers, fractionators, strippers, absorbers, and barometric condensers in which the vapors (or gases) exchange heat with liquids.

Here's how you can get

MORE EFFICIENT OIL RECOVERY from your flooding operations:



INSIST upon these standards for your flooding medium

1. ***Chemical stability***
2. ***Oil content zero***
3. ***Iron content 0.2 parts per million***
4. ***Turbidity 1 part per million***

Most operators agree that these standards for the flooding medium (water, produced brine, or both) are necessary for minimizing clogging of the input formation. INFILCO *complete* treating plants, which include the highly efficient ACCELATOR® Stabilizer, provide water within the specified limits. Closed systems, or other types of partial treatment, seldom meet these exacting requirements.

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5618 (OG)

GLYCOL-AMINE PLANT OPERATION

Impurities Foul and Plug Plant Equipment

by J. W. Cronenberg

SINCE only slight improvement could be realized environmentwise for corrosion-plagued plant equipment, El Paso Natural Gas has turned to the use of aluminum and other suitable alloys. For heat-exchanger service 3S and 61S aluminum and Croloy 5 have proved very satisfactory materials.

Carbon-steel bundles that averaged 8-months service in Plant No. 13 were replaced with aluminum exchangers whose average life is 22½ months. These aluminum bundles were placed in steel shells and the tubing was rolled into steel-tube sheets without any bimetallic corrosion occurring in operation. It is believed that the addition of glycol to a low-per cent water-amine mixture renders the solution non-electrolytic.

Therefore dissimilar metals may be used in glycol-amine plants. In addition, aluminum has been used successfully in still feed sections (though not in still rectifying sections) and in still feed-line piping.

Mechanical cutting . . . Thus far aluminum has not been found to be a satisfactory material for reboiler bundles, first because of mechanical cutting of the tubes at the tube-support plates (tube movement is believed to be due to evolved gases) and second, because of erosion and/or corrosion of the tube interior due either to moisture in the steam or because of the alkalinity of the steam.

The use of all aluminum-finned tubes supported in the tube-support plates by stainless-steel sleeves has to date appeared to have eliminated the mechanical-cutting problem. Steam separators installed on the steam lines adjacent to the reboiler has alleviated but not eliminated failures from the steam side.

Author is with El Paso Natural Gas Co., El Paso, Tex. Paper presented at N.G.A.A. regional meeting, Odessa, Tex.

Inhibited Admiralty Tubing

Successful use of phosphorically inhibited admiralty tubing has been made in several of our plants in solution-cooling service for a number of years. In cooling-tower atmospheric sections, these admiralty tubes have not yet failed from solution side corrosion and have resisted scale buildup on the water side far better than carbon-steel tubes.

Solution cooling is of utmost importance in the glycol-amine process since improperly cooled solution will cause excessively hot gases to leave the contactor and thus poor dehydration.

A sweet-gas blanketed-solution surge tank added to the plant system provides suitable additional surge capacity, prevents the possible contamination of the solution by contact with oxygen, and also provides a settling basin for finely suspended particles of iron sulfide carried in the solution. This brings us to an important operation problem connected with glycol-amine plants.

Fouling

Fouling of plant equipment by suspended iron sulfide in the solution and by oil and other impurities brought in with the gas constitutes a major operating problem. Solution exchangers, solution coolers, stills, and even the contactors have been seriously fouled by these impurities. This fouling has interfered with heat transfer and solution circulation by plugging tubes and bubble-cap teeth.

A suitable inlet-gas scrubber should be installed to prevent, or at least reduce, quantities of oil, dirt, and/or liquid hydrocarbons from entering the solution stream in the contactor.

Filtration of the glycol-amine solution on a side-stream basis has not been found economically feasible. Filters of all types have been tested in actual plant operation including two of the precoated type of filter. One employed diatomaceous filter aid alone, and the second leaf type of unit used both asbestos and diatomaceous earth as a filter aid.

High viscosity . . . Neither of these units operated satisfactorily. Viscosity of a 74 per cent diethyleneglycol, 20 per cent monoethanolamine, 6 per cent water mixture at 80° F. is 24.5 centistokes compared with 1.94 centistokes for a 75 per cent water, 25 per cent monoethanolamine mixture at the same temperature.

This high viscosity plus oil carried in the glycol-amine solution stream is believed to be the reason why filtration is extremely difficult. Operating problems such as channeling, excessive operator attention, and extremely short onstream time were encountered with other types of filters.

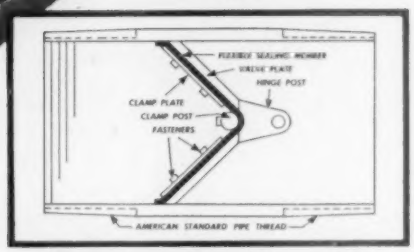
Because of the aforementioned, filtering of glycol-amine solutions has been all but abandoned in El Paso Natural plants.

Solution reclaiming . . . However, solution reclaiming has assumed ever greater importance. A permanent installation is located at 17 different plants while a portable unit serves other locations.

These are small distillation units which operate on a side stream of lean solution. Because of the high boiling temperature of the diethyleneglycol, (460° F. at 14.7 psia.), vacuum-distillation units have been built. Reclaimers have been sized to handle 1-2 g.p.m. which varies from 0.32 to 3.5 per cent of the solution circulation rate.

Editor's Note—Part 1 of this series was published December 31, 1956, page 209.

NOW A UNIQUE MULTI-PURPOSE CHECK VALVE



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Write for Bulletin

Techno Corporation
16 West 5th Street, Erie, Pa.

OYSTER BEDS are pointed out to Interstate's chief inspector by one of the oyster farmers.

DRAGLINE maneuvers in the canal to dig pipe trenches.

FINISH WELD is made at the station. Behind the welder final coating and wrapping are applied to joint.

APPLICATION of final enamel coating is given to the joints on the barge before they are dropped.

JOINT IS WRAPPED with felt as shown here, before coating dries or hardens completely.

Louisiana oyster beds are avoided when . . .

Interstate lays Pelican Island pipeline

EXTENSION of a 12-in. trunk line to Pelican Island recently expanded Interstate Oil Pipe Line Co.'s pipeline service in the Louisiana Gulf Coast area.

The line is a section of Interstate's Raceland, La., district (or South Louisiana) system and formerly terminated in Lake Washington field at the eastern fringe of Barataria Bay. It was extended from this point some 16 miles in a southeasterly direction to a shore-based pump station on Pelican Island. Pelican Island is about 25 miles east of Grand Isle and about 6 miles southwest of Buras, La.

Pelican Island station will receive crude brought by producers' flow lines from leases some 10 miles off shore in Block 30. The crude, destined for Interstate's Anchorage terminal across the Mississippi River from Baton Rouge, was formerly barged from the leases to Grand Isle, going by pipeline from there to Anchorage.

Surveying the route presented the usual difficulties encountered in any construction work done in the Gulf Coast marsh area. To begin with, travel in the area is restricted mostly to boats. Walking over the marsh is tough going.

Triangulation was used in surveying the route, and sometimes it was a long boat ride around a portion of the marsh to reach the other side and pick up the projected line.

A visitor to the area may find it hard to imagine there is anything for animals to live on in the marsh or in the sluggish waters. However, the survey for the line had to include consideration for the huge trapping and oyster-cultivating industries here which run into millions of dollars a year. The route had to be planned to avoid as much as possible oyster beds and the disturbing of the marsh that is the habitat of the muskrat.

Boats available . . . Boats seem to be everywhere in this country. They range from the fisherman's small skiff with its one-cylinder inboard motor to huge barges containing complete deep-well drilling rigs and quarter boats. Although making the job more difficult, it was not surprising to find that numerous navigable bays, bayous, and canals had to be crossed by the line.

Finding the route which would cross the least number of these, and in the right places, was part of the planning. Other pipelines had to be crossed, too—in one instance a big-inch gas pipeline. The line was maneuvered through the drilling rigs, producing wells, and gathering lines in Lake Washington field.

After the route was tentatively

ARMSTRONG BROS.
Better PIPE TOOLS

PIPE VISES

ARMSTRONG BROS. Pipe Vises. Standard Hinged Vises have drop forged (unbreakable) hooks, and replaceable tool steel jaws. Smaller vises have 1-piece jaw which prevents kinking of small or thin wall pipe. T-Handles have oval ends that will not pinch hands. The Open Side Vise mounted on a bench, truck, or with special chain attachment on any post or tree. The Chain Vise has drop forged base, jaws and handle. Chains are proof-tested. Patented 1-piece jaw prevents damage to small pipe, thin wall conduit or tubing.

Write for Catalog

Write for Pipe Tool Circular.

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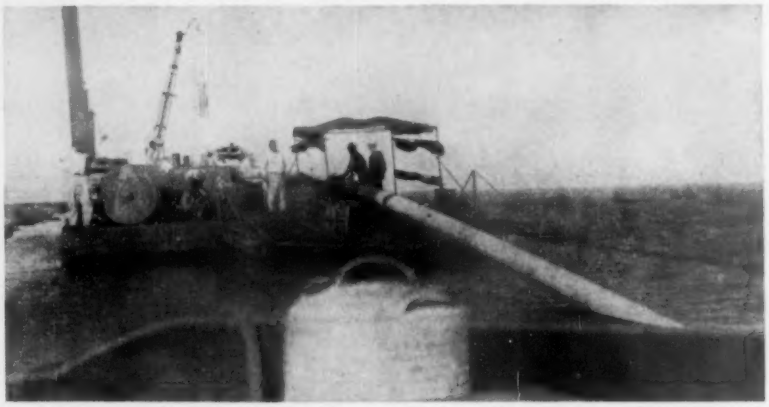
PIPELINE PATROL



AS BARGE MOVES FORWARD the pipeline slips beneath the surface of the water into its trench.

PIPELINERS BEVEL ends of the joints before they make a tie-in to the rest of the pipeline.

selected, further difficulties arose in the obtaining of rights-of-way. The determination of ownership in this particular area is confusing, to say the least, due to overlapping surveys.

Water areas are state-owned; however, acreage is leased to oyster growers as sites for their beds. It was necessary to check with the Wildlife and Fisheries Commission to find the location of such leases. To assist in cooperating with the oyster men in location and evaluation of the beds, Interstate procured the services of a resident oyster expert.

It was necessary also to coordinate with the plans of oil producers and other industries in the area so as not to interfere with existing or proposed plans for canals, drill sites, etc.

With the survey and rights-of-way completed and specifications drawn up, construction began on September 17, 1956.

Approximately 16 miles of 12-in. line was laid by Glaser Construction Co. of Lafayette, La. The work was done from the usual series of lay barges coupled together in a string.

As the joints were mass-produced at the various stations, the barges were pulled out from under the completed pipe a joint at a time, allowing the line to slip into the ditch-within-a-ditch.

Pipe trench . . . Glaser also performed the ditching operations. The line was laid in a pipe trench in a 35-ft. flotation canal which will be closed at both ends of each section of marshland when the job is completed. Digging of the canal and trench was hampered by hard sand strata.

The pump station on Pelican Island, built by Sam Carline Construction Co. of Berwick, La., consists of a creosoted piling-supported platform. It contains reciprocating pumps driven by high-speed 140-hp. gas engines typical of the small pump stations of the area. It also includes a small office and storage space.

PIPELINE PATROL

TWO JIB CRANES are placed so the outer reach forms tangent circles.

Jib cranes replace expensive structures

AN unusual application of standby overhead equipment has been devised by Service Pipe Line Co. and is now in use at several of its pumping stations.

It has been customary, where cranes were required to place pumps, motors, etc., and remain for use by maintenance personnel, to build an open structure to support a bridge crane to cover the area.

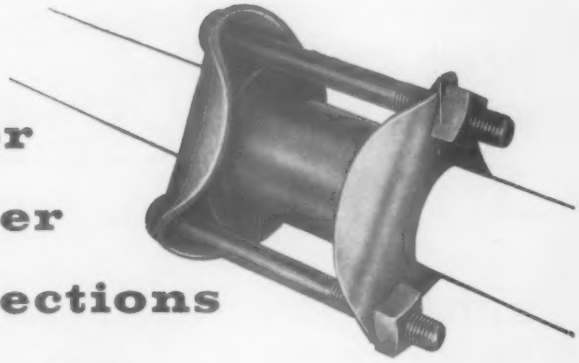
Service has substituted two jib cranes for the bridge crane. The resulting cost is about 25 per cent of the bridge crane and supporting structure.

By placing the jib cranes so the outer reach of the spans formed tangent circles, the necessary area was covered without undue eccentric loading on the jib cranes. The 360° jib cranes are the product of Chicago Tramrail Corp.

Welding course offered

NATIONAL TECHNICAL TRAINING SERVICES, Buffalo, N. Y., has inaugurated a correspondence course on welding developed by the Canadian Welding Bureau, a service organization sponsored by the metals industry and the welding-equipment manufacturers. It was prepared by a technical staff recruited from industry.

More than 2,000 individuals have been enrolled. The course includes welding methods, procedure control, distortion control, weldability, welding metallurgy, design, inspection, materials and equipment, estimating, and costs and economies.



for tighter connections join pipe

THE DRESSER WAY!

Pictured below are Dresser Style 38 Couplings on the meter manifold of a large oil company's water flood project. These couplings are equally useful in oil piping applications both in and around refineries.

Whatever the application, Dresser Style 38's are fast and easy to install. No pipe threading is necessary. The only tool required is a wrench. And, because of the specially compounded rubber gaskets —which permit up to 4° deflection at joints—offset pipe ends can be coupled making a permanent bottle-tight connection, every time.

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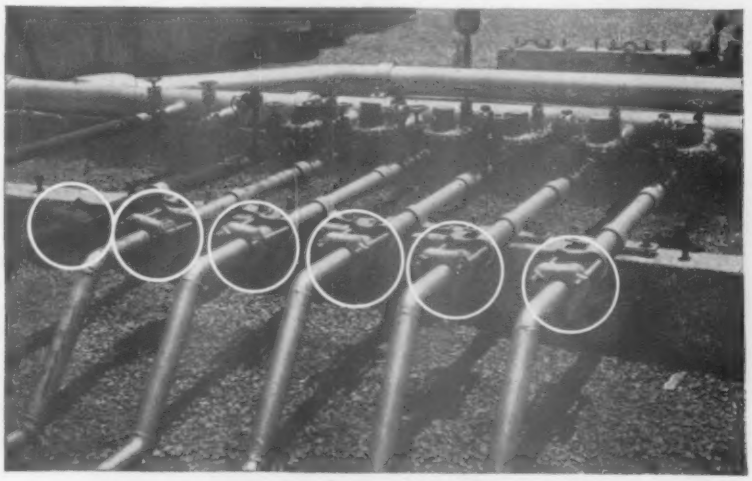

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Among the Drilling Contractors

Contractors Organize New Orleans Chapter

Drilling contractors working in the eastern Louisiana and Mississippi Gulf Coast area have formed a regional chapter of the American Association of Oilwell Drilling Contractors. It is the association's seventeenth regional chapter. The region embraces the area south of Baton Rouge and east of Morgan City, in Louisiana, and southern Mississippi.

Sixteen contractors in the area attended the organizational meeting in New Orleans. They chose Earl G. Bateman, of Bateman Drilling Co., chairman; Charles A. Norton, Norton Drilling Co., vice chairman; and Charles F. Hayes, Rimrock Tidelands, Inc., secretary-treasurer.

Brad Mills, executive vice president, and Kenneth D. Alpiger, represented the association's Dallas headquarters staff at the chapter's organizational meeting.

Contractors Urged to Pay More Heed to Field Study

The American Association of Oilwell Drilling Contractors has set forth three prime objectives for 1957. As outlined by the association's new president, Jack H. Abernathy, of Big Chief Drilling Co., Oklahoma City, they are:

1. Learn all possible from the continuous study of field practices.
2. Upgrade personnel.
3. Increase chapter activities, making each member more conscious of the value and importance of his association membership.

Pointing out that contractors, with every well drilled, add to the great wealth of drilling technology, Abernathy stated that the problem of the association is to sift and evaluate the material and conduct field research to verify it.

For upgrading personnel he stressed the importance of training programs and the value of taking advantage of association facilities and training aids. He rated training and keeping qualified men to do the job as the most serious problem of the drilling industry.

Abernathy urged contractors to take a more active part in association work with a statement that effectiveness of a trade association has a direct ratio to the percentage of the industry it represents. Contractors drill 93 per cent of all wells in the country, and, of that number, association members drill 75 per cent, he said.

Dernick and Guyer Form New Contracting Company

Dernick-Guyer, Inc., is a newly formed contract-drilling and consulting firm operating in the Rocky Mountain region and western Canada. It is headed by J. E. Guyer, president, and Harry Dernick, vice president and secretary-treasurer. Main office is in the Midland Saving Building, Denver.

Guyer formerly was president of American Stratigraphic Co., a consulting geological firm, which he founded. He is a graduate of the Colorado School of Mines. Dernick has been engaged in the engineering work, supervision of drilling and producing operations, and property evaluation in all producing areas of the United States and Canada. Since 1955, he has been a consulting engineer at Denver. Previously, he had been associated with Republic Natural Gas Co. and Deep Rock Oil Corp. He is a graduate of the University of Oklahoma.

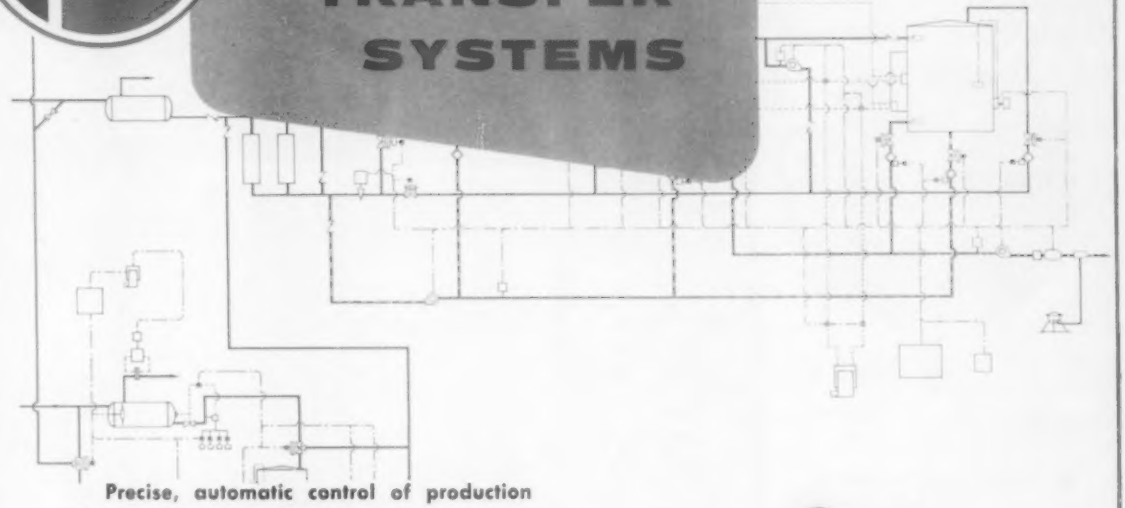
Miracle-Fifer Drilling Co., Denver, has a rig on a far-wildcat location in northwestern Nebraska, where it is drilling on contract for Sam G. Harrison. Location, at 1 Hatch, in 13-27n-57w, is in Sioux County, about 35 miles northwest of Scotts Bluff, and about 7 miles from the Wyoming line.

Gibson Drilling Co., Kilgore, Tex., has contracts for two 4,600-ft. East Texas wildcat tests to be drilled for Watburn Oil Co. and others, of Tyler, Tex. One is 3 miles east of Mount Selman, in Cherokee County, on the operators' Boone lease, in the P. Lewis Survey. The other is 4½ miles northwest of Overton on their Soape lease, in the H. C. Cooke Survey.

J. B. Markham, Oil City, La., is drilling on the first of two wildcat tests he has contracted to put down for E. F. Neely, of Shreveport, in sparsely explored Kemper County, eastern Mississippi. Drilling is Neely's 1 Shepard, 9 miles west of DeKalb, in 19-11n-15e. When this test is completed

got

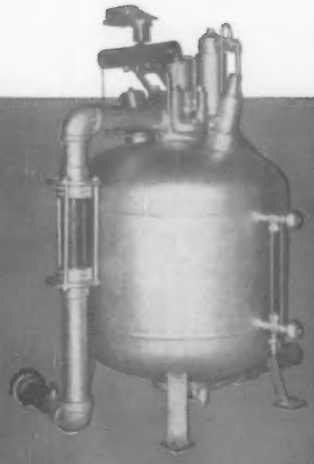
CUSTODY TRANSFER SYSTEMS



Precise, automatic control of production from wellhead to gathering system is a reality with GOT Custody Transfer Systems. Featuring the new GOT Volume Meter and GOT programmers, pilot controls and valves, these systems reduce the need for expensive tank batteries, eliminate the possibilities of human error in switching, testing and gauging procedures, provide for remote control of entire leases or individual wells. All production operations are handled automatically, including testing, sampling, gauging, recording of total production of oil, water and gas, and final transfer to the pipe line. When desired, these procedures may be programmed for as much as 30 days in advance.

The economies of GOT Automatic Lease Systems have been proved in installations of all types, ranging from simple tank switching controls to completely automatic custody transfer. Discounting all other advantages, the savings in tank battery equipment alone will go a long way toward paying for the system.

GOT Automatic Lease Systems are furnished for electric, pneumatic or electro-pneumatic control. For complete engineering data and quotations on your requirements, write to our Longview office.



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WRITE FOR BULLETIN 4B

THE MERCOID CORPORATION
4211 Belmont Ave., Chicago 41, Ill.

the rig will be moved to the second test, 1 Stennis, 7 miles southwest of DeKalb, in 1-10n-15e. Its contract is for 2,500 ft.

B. G. Byars Power Drilling Co., Tyler, Tex., is drilling for Payne-Johnston and others at a wildcat location 5 miles north of Tyler, in Smith County, East Texas. It is a 7,700-ft. test at 1 Black, in the J. Lane Survey.

Shoreline Drilling Co., New Orleans, has taken on another deep-drilling job in St. Mary Parish, Coastal Louisiana. It is a 13,500-ft. test for Jett Drilling Co. and Southern Natural Gas Co. at a wildcat location northwest of Morgan City. Spot location is in 39-15s-12e, on the operators' St. Mary Bank & Trust Co. lease.

Ashby Drilling Co. is drilling for Shell Oil Co. at a wildcat location 1½ miles northeast of Horn field in Banner County, southwestern Nebraska. The job is Shell's 1-C Horn, in 35-20n-53w.

Chandler-Musgrove Drilling Co. has a new wildcat operation in Cheyenne County, southwestern Nebraska. It is for John McKnab at 1 Kruse, in 13-15n-51w, 8 miles southwest of Gurley.

Woolf & Magee, Tyler, Tex., are working on an 8,100-ft. contract job 3¾ miles southeast of Enterprise, in Catahoula Parish, East Central Louisiana. Operators are A. J. Hodges Industries, Inc., and McCain, Mobley & Stephens, of Shreveport. It is a Lower Cretaceous test at 1-B Louisiana Central, in 10-10n-6e.

Sharp-Gulf Drilling Co., Midland, Tex., is on a new deep job for Natural Gas & Oil Co. in the Lake Fields area, 10 miles northeast of Houma, in Lafourche Parish, southwestern Louisiana. It is a 13,200-ft. test on State Lease 2926, in 36-16s-18e.

Kerr-McGee Oil Industries, Inc., Oklahoma City, has a new offshore wildcat operation for Continental Oil Co. (C.A.T.C. group operator) in Block 81, West Delta area, Gulf of Mexico, off the west side of Southwest Pass, Plaquemines Parish, Louisiana. Drilling is set up to go to 1,000 ft. It is on State Lease 986 (OCS-0149).

B. L. McFarland, Inc., Midland, Tex., is keeping a rig working for Texas Crude Oil Co. in the Gladiola area, 25 miles northeast of Lovington, in northeastern Lea County, New Mexico. Present job is at 2-19 State "A," in 19-12-38. It is another 12,200-ft. test.

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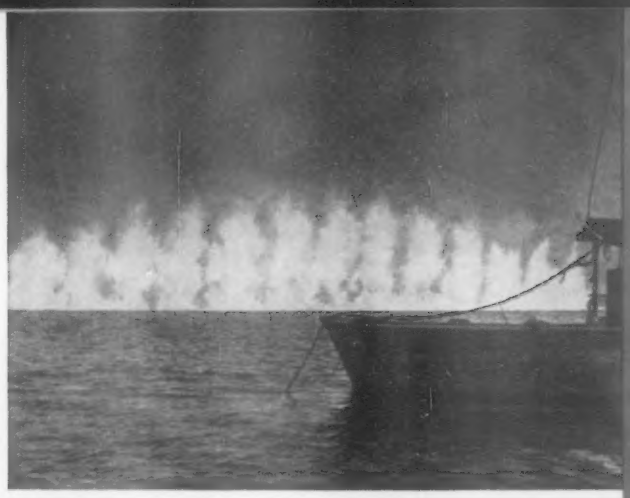

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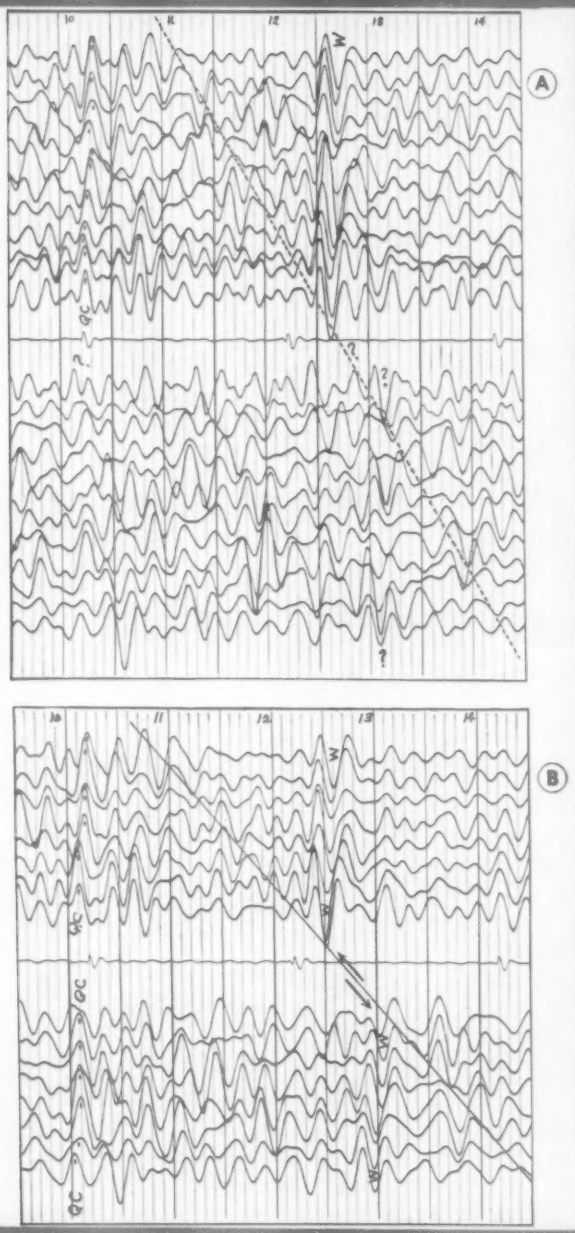

Which record would you interpret with confidence? Records (A) & (B) were shot out of the same hole—with the same spread length and location. Record (B) clearly demonstrates the superiority of Petty's patented "Vari-Pattern" technique.

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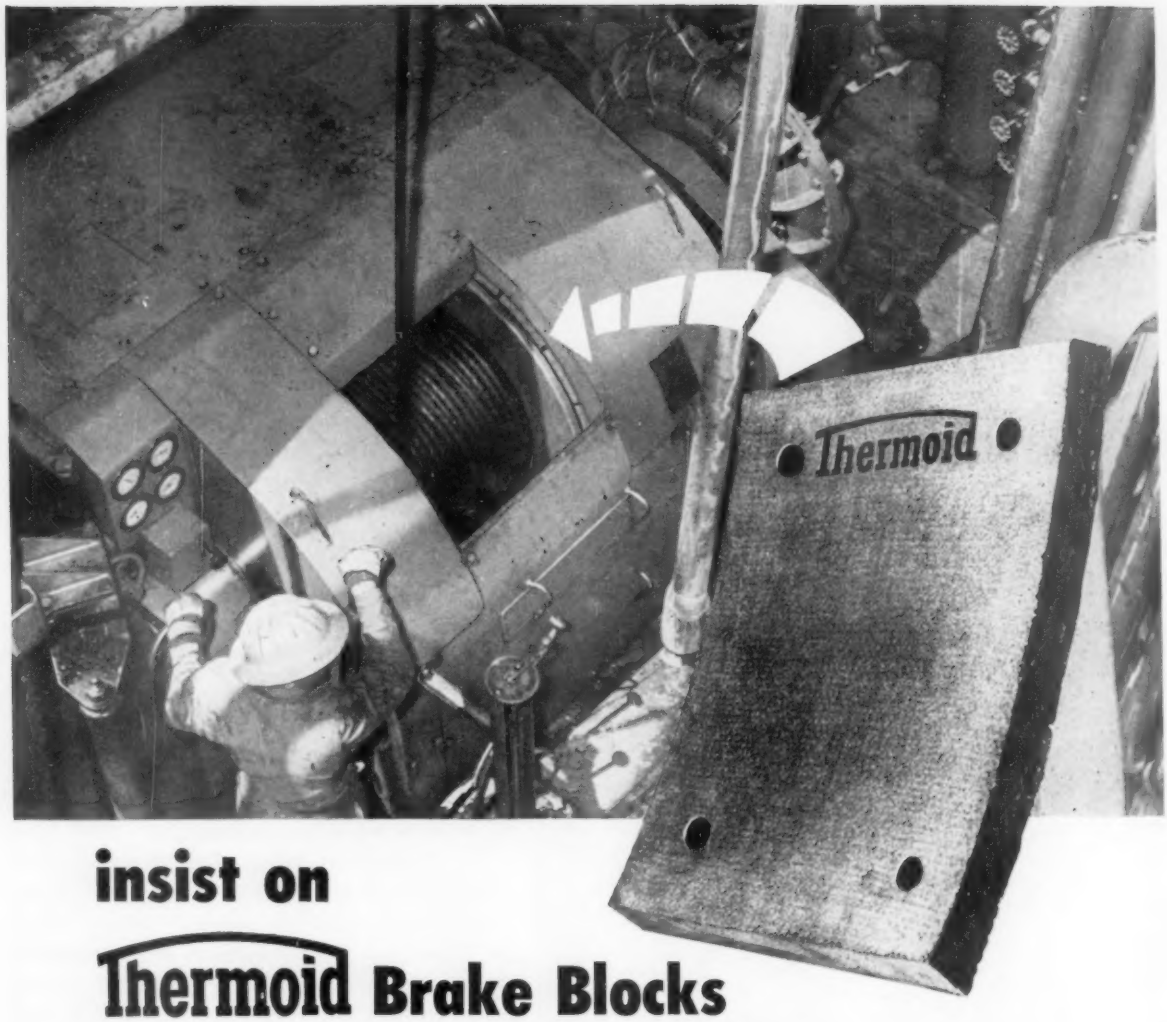

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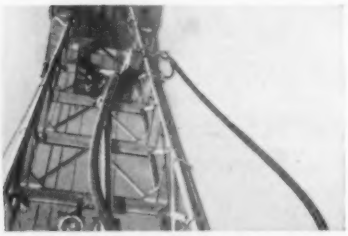

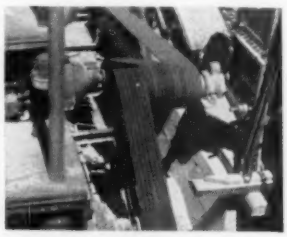

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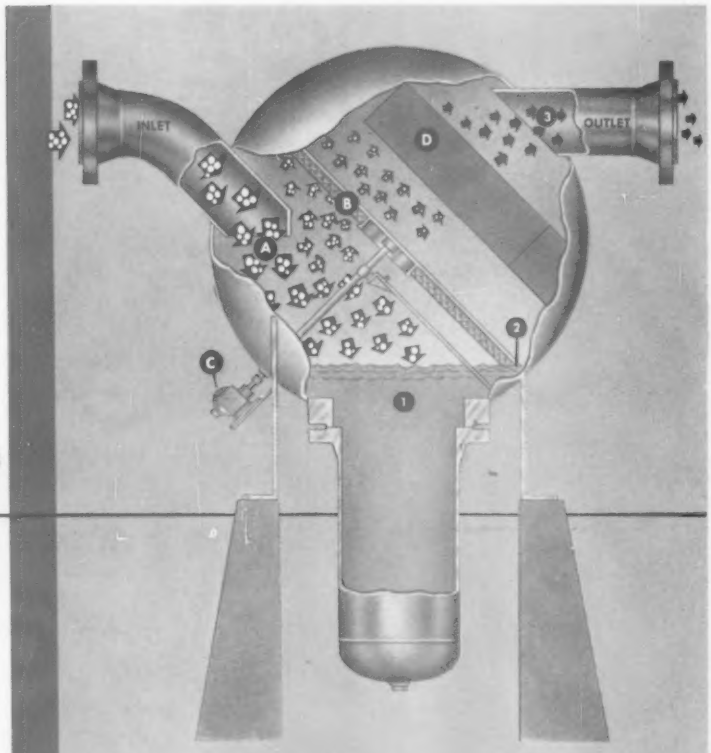
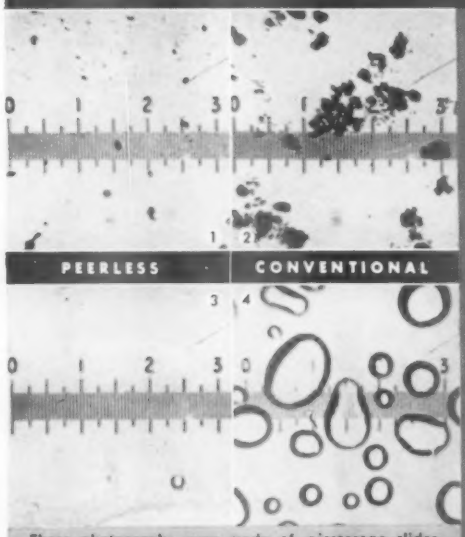


(A) The majority of incoming liquid and solid particles are directed down into reservoir. 1

(B) Lighter solid particles carried by gas stream are separated on surfaces of contactor which are kept wet and clean by revolving through liquid reservoir. 2

(C) Contactor is revolved by explosion-proof gear motor.

(D) Mist Extractor removes any remaining liquid particles from gas stream prior to outlet. 3



These photographs were made of microscope slides introduced downstream of the Scrubosphere and a conventional vertical oil bath cleaner under the same operating conditions. Plates 1 and 2 show the comparative amounts of iron oxide not removed with the amounts introduced being identical. Plates 3 and 4 indicate comparative oil loss with vapor rate through the vessels being the same.

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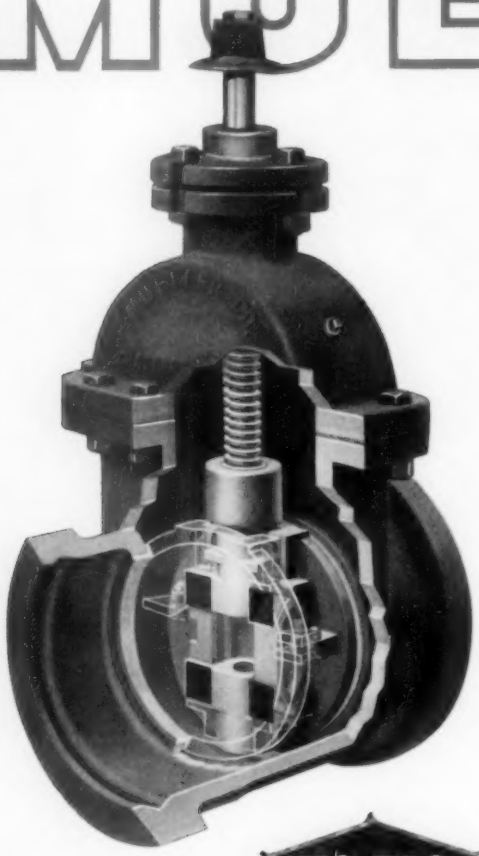

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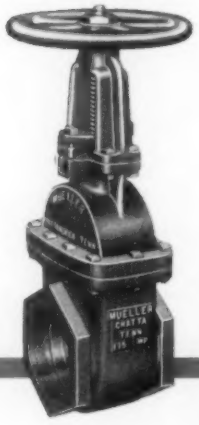

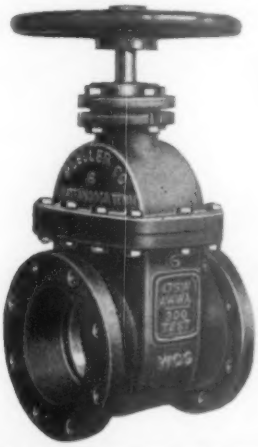

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(Left) NO-OX-ID and NO-OX-IDized Wrapper application by Traveliner. (Right) NO-OX-ID kettle.

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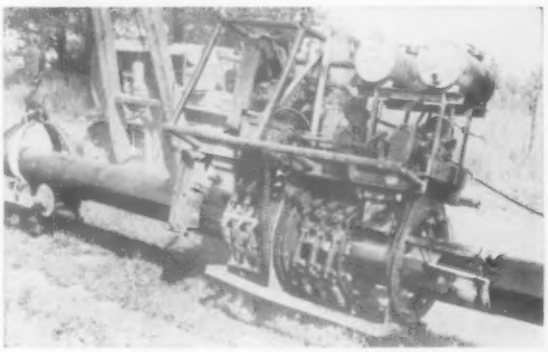

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B.	San Andres	15,000	21,000	5	4	54	120	65
C.	Springer Sand	6,000	12,000	3	8	49	51	51
D.	Penn. Cgl.	6,000	6,000	4	*	345	144	80
E.	Miss. Chat	6,000	12,000	10	Dead	435	306	192
F.	Miss. Chat	6,000	10,000	5	10	—	33	30
G.	Miss. Chat	6,000	12,000	10	*	—	330	360
H.	Clear Fork	10,000	20,000	6	*			51
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J.								99
K.								51
L.								68
M.								30

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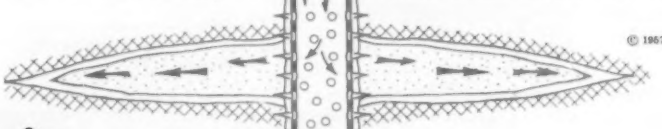

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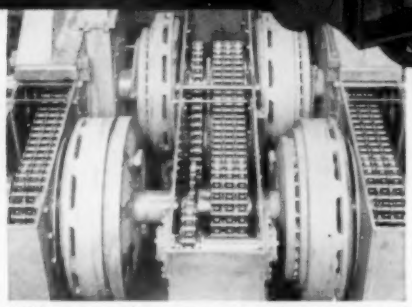
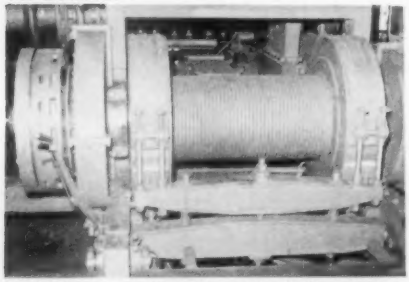


- *With New Three Speed and Reverse All Friction Clutch Transmission.*
- **Available with Parkersburg 22" Single Hydromatic Brake Mounted on Transmission *with 6 Speeds Between Drum and Brake* — The Best Hydromatic Brake Arrangement Yet Devised!**



- **With New Beam Equalizer, Single Nut Adjustment Lever Type Brake which CANNOT KICK.**
- **Oil Bath Drum Drive Chains Outside Frame.**
- **High and Low Clutches on End of Drum Shaft.**
- **Heavy Plate Chain Cases and Covers.**

RATED DEPTH CAPACITY
9,000 Ft., Using 4½" Drill Pipe
11,000 Ft., Using 3½" Drill Pipe

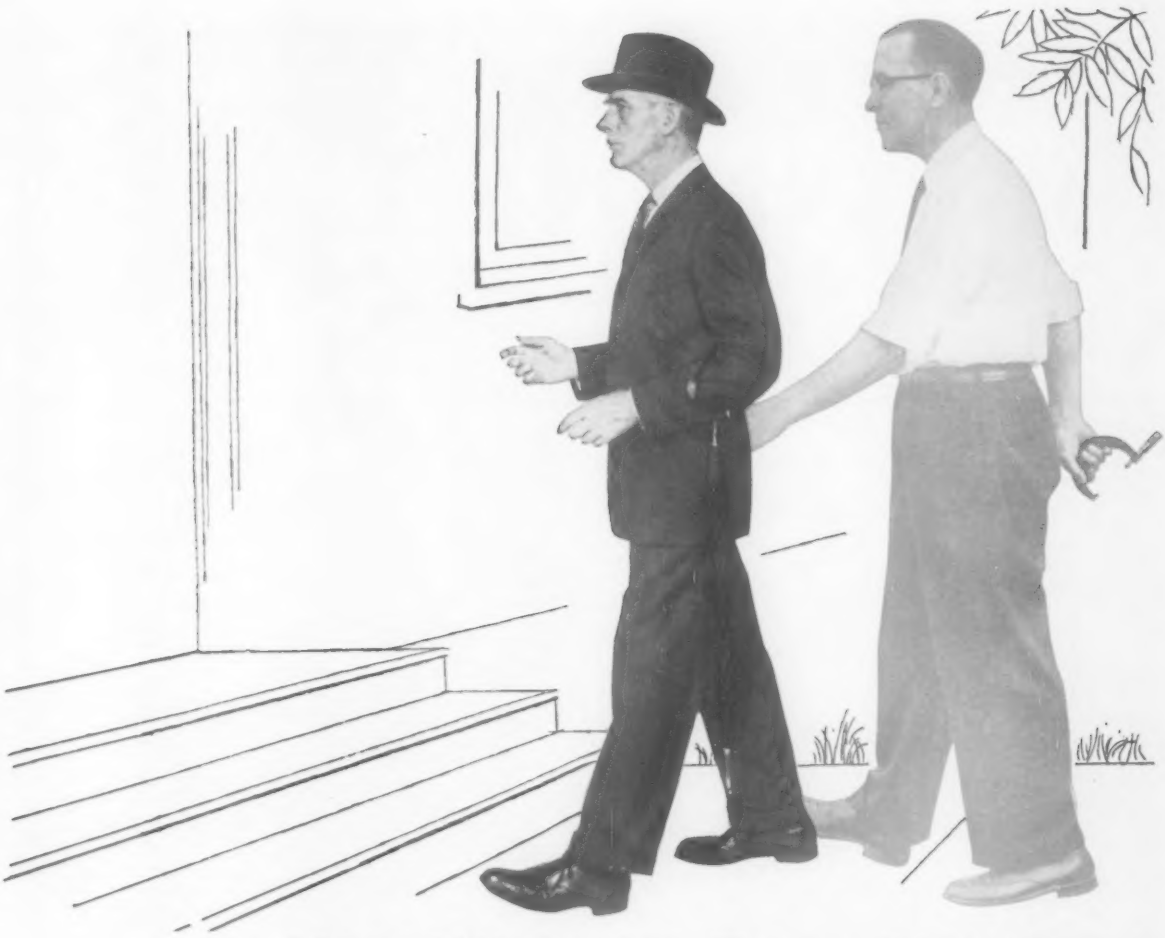
RATED POWER CAPACITY
Direct Drive—900 HP
With Fluid Couplings—1100 HP
With Torque Converters—1350 HP

unquestionably...the most advanced and modern rig in the world today

YOU OWE IT TO YOURSELF TO INVESTIGATE
THIS NEW AND MODERN RIG BEFORE BUYING

Write for Full Details

WILSON MANUFACTURING CO., INC.
WICHITA FALLS, TEXAS • the home of RED IRON



Your Wickwire Rope Distributor and our die maker... ready to serve you

This die maker—one of the skilled technicians responsible for the quality of our rope wire—is with your Wickwire Distributor every time he makes a call.

True, he's physically in our plant, working to tolerances of 1/10,000 of an inch as he fashions the super-hard carbide dies used to produce every foot of rope wire. But, whenever your Wickwire Distributor makes his call, he has the full assurance that *every* wire in the product is exactly the size it should be and has a smooth, silky surface finish. This careful attention helps assure a rope which will perform successfully.

It's just one more reason why your Wickwire Distributor knows he's got top-quality rope, slings and strand to sell . . . and that these products will serve you well.

CF&I WICKWIRE ROPE A CF&I PRODUCT

4083

A PRODUCT OF THE COLORADO FUEL AND IRON CORPORATION

STATEMENT OF CONDITION

At the Close of Business December 31, 1956

ASSETS

Cash on Hand and Due from Banks		$338,382,415.31
United States Government Obligations	$118,629,268.26	
Public Housing Authority Obligations (Fully Guaranteed)	4,447,580.60	
State, County, and Municipal Bonds	18,184,286.86	141,261,135.72
Other Bonds		2,597,144.77
Stock in Federal Reserve Bank		1,500,000.00
Loans and Discounts		366,441,151.90
Income Accrued		2,456,648.10
Letters of Credit and Acceptances		19,787,457.42
Banking House and Equipment		9,588,236.89
Other Assets		130,513.96
		$882,144,704.07

LIABILITIES

Capital Stock	$ 22,000,000.00	
Surplus Fund	28,000,000.00	
Undivided Profits	4,675,017.24	$ 54,675,017.24
Reserved for Contingencies		7,368,504.40
Reserved for Taxes, Etc.		5,573,501.09
Deferred Income		1,552,267.33
Letters of Credit and Acceptances		19,787,457.42
DEPOSITS:		
Individual	481,810,804.97	
Banks	294,823,005.37	
U. S. Government	16,554,146.25	793,187,956.59
		$882,144,704.07

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Senior Vice President

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President

TODDIE LEE WYNNE
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*Advisory Director

The major difference
between banks of today
is the way people are treated

Ben Wooten
PRESIDENT

GIVE US AN OPPORTUNITY TO SAY YES

81 years of growth through service to people

1st NATIONAL BANK in Dallas

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

Mr. Nicolson demonstrating "P-B" Safe-Lok protectors in the field.

"20 years' work with oil-field rubber products has shown us the benefits of NEOPRENE firsthand"

—says **G. F. NICOLSON,** Vice President and General Manager, Byron Jackson Tools, Inc.

"Byron Jackson has had a full line of oil-field rubber products for more than twenty years," says Mr. Nicolson, "and this long experience has shown us firsthand the specific benefits of neoprene. That's why neoprene was used in the development of our new lock-on protector. We wanted the best design and the best materials available. That meant 100% neoprene."

Mr. Nicolson doesn't limit neoprene to drill-pipe protectors, either; Byron Jackson uses it in their "P-B" pipe wipers and wire line guides. Neoprene is a natural for oil-field products because it stands up to the abuse of oil, heat, sunlight, abrasion, and flex cracking.

You, too, can get longer service life from your rubber products—just specify neoprene, Du Pont's synthetic rubber, the next time you order.

NEOPRENE

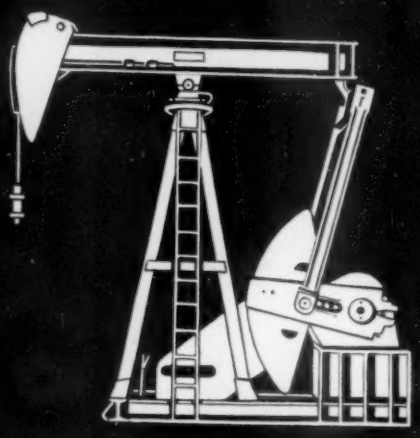
The rubber made by Du Pont since 1932

DU PONT

REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

Read any good ads. lately?



LEGRAND 'L' SERIES PUMPING UNITS

CLASSIFIED advertising

SITUATIONS WANTED

Robot willing to work long tedious hours on tough assignments in any conditions. 24 hours a day, 365 days a year, without holidays, willing to go anywhere.

Rugged Completion Equipment and Pumping Accessories to match . . . write for full particulars.

FOR SALE EQUIPMENT

Pumping Units.
Pumping Accessories & Fittings.
Casing Heads.
Tubing Heads.
Christmas Trees.
Chokes and Flow Controls
Floating Equipment.
Measuring Equipment.
Stuffing Boxes.
Wing Unions, Misaligning.
Adaptors, Flanges and Spools.
Flanges, Companion & Welding Neck.
Elevators, Tubing & Sucker Rod.
Block Tubing.
Tubing Spiders and Slips.
Pulleys.

LEGRAND

LE GRAND SUTCLIFF & GELL LTD.

HORSTED AIRPORT . ROCHESTER . KENT . ENGLAND

We are represented in the following areas by Agents who will be pleased to assist you.

CANADA
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111-58th Avenue South
West Calgary
Alberta

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Industrial Agencies, Ltd.
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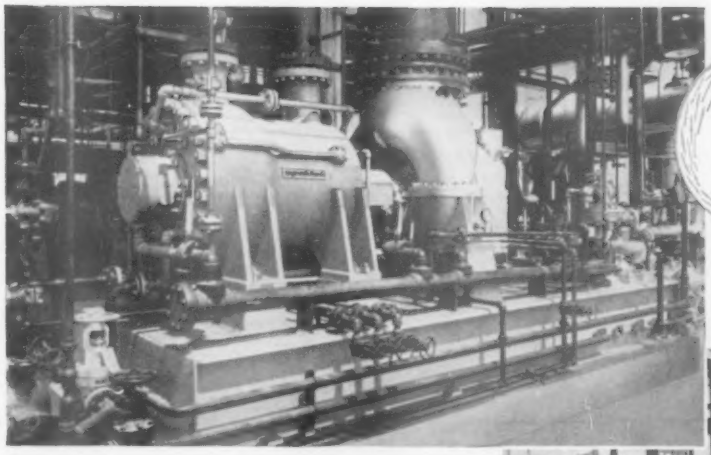
San Fernando
Trinidad, B.W.I.

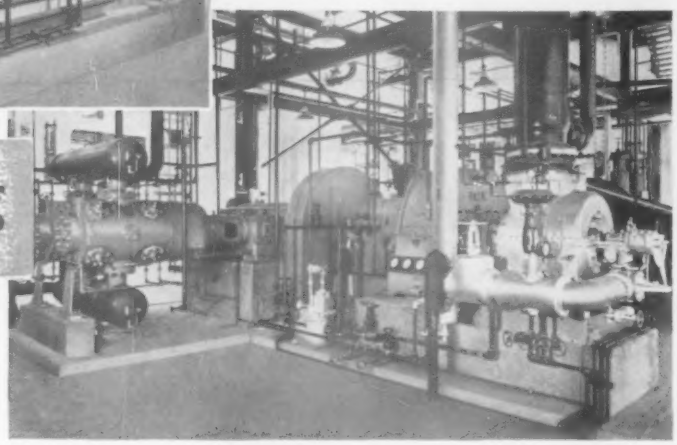
E. VENEZUELA
A-Z Export S.A.
Apartado 4026
Puerto La Cruz
E. Venezuela

W. VENEZUELA
A-Z Export S.A.
Apartado 704
Maracaibo
W. Venezuela



Centrifugal

This six-stage I-R Centrifugal Compressor recycles hydrogen-rich gas for the new 17,000 B/D catalytic reformer at Richfield Oil's Watson Refinery. Compressing 102,000,000 cfd from 500 to 670 psig, it is driven by a 2185 hp turbine.



Reciprocating

One of the two Ingersoll-Rand Class HHE Reciprocating Compressors serving desulphurizer unit boosts 59,000,000 cfd recycle gas from 675 to 765 psig. The other HHE compresses 21 million cfd of feed gas from 503 to 765 psig. Both are turbine driven.

BOTH types of I-R COMPRESSORS serve new catalytic reformer at Richfield's Watson Refinery

THE ABOVE installations at Richfield Oil Corporation's newly expanded refinery at Watson, Calif. illustrate an important point. That is Ingersoll-Rand's ability to meet every refinery compression requirement—with whatever type of unit is best suited to actual operating conditions.

The I-R **Centrifugal Compressor** recycles hydrogen-rich gas in the 17,000 B/D reformer. For the reformer's desulphurization unit, two I-R Class **HHE Reciprocating Compressors** are used—one handling hydrogen-rich feed gas, the other on recycle service. See picture captions for compression details.

This new addition to Richfield's Watson Refinery, engineered and constructed by Ralph M. Parsons Co., also uses an Ingersoll-Rand Class ES compressor for catalyst regeneration, an ES-NL unit with non-lubricated cylinders to supply instrument air, and 10 I-R centrifugal pumps for process services.

Whatever your compression requirements, Ingersoll-Rand can supply the equipment *best suited* to the job. With a full line of both centrifugal and reciprocating compressors, I-R recommendations are based solely on the optimum performance and economies of each application. Your Ingersoll-Rand representative will be glad to discuss your compression problems at any time.

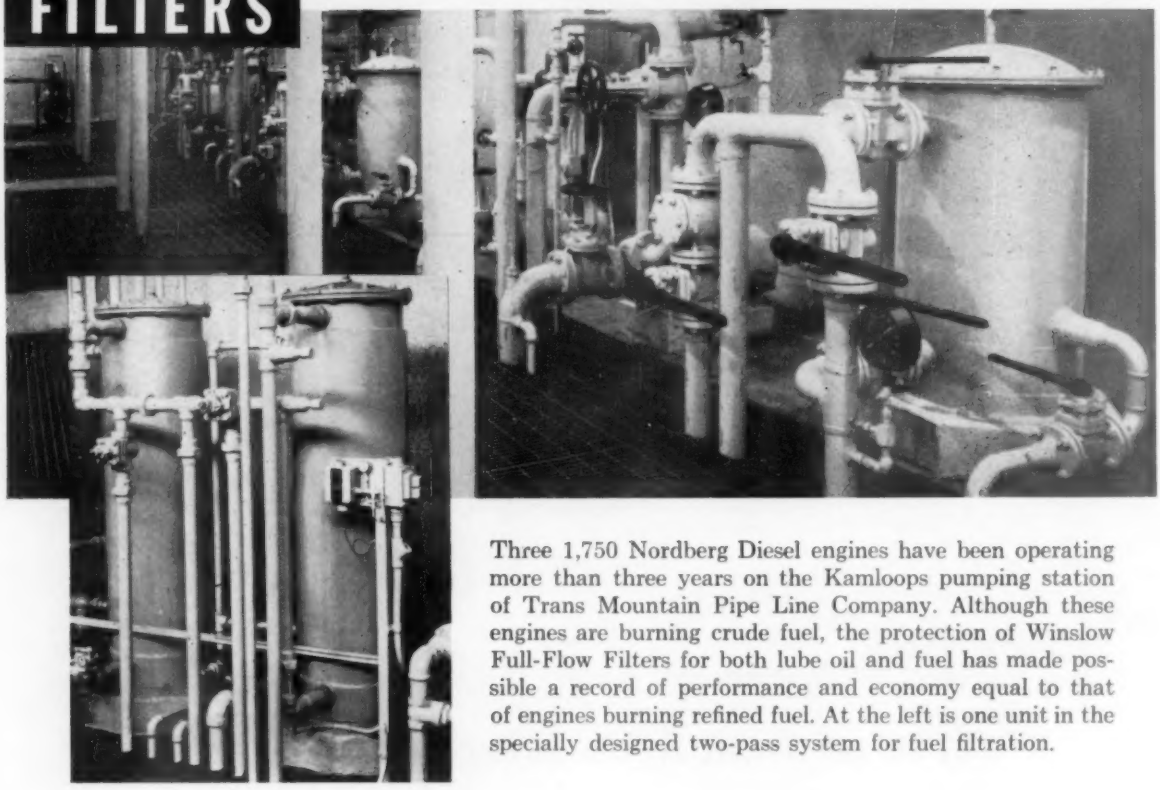
1-446

Ingersoll-Rand
11 Broadway, New York 4, N.Y.

COMPRESSORS • TURBO-BLOWERS • ROCK DRILLS • AIR TOOLS • CENTRIFUGAL PUMPS • CONDENSERS • GAS AND DIESEL ENGINES

WINSLOW *Full-Flow* FILTERS

Case History Report No. 34 Shows Why Engines Protected by WINSLOW FILTERS Last Longer



Three 1,750 Nordberg Diesel engines have been operating more than three years on the Kamloops pumping station of Trans Mountain Pipe Line Company. Although these engines are burning crude fuel, the protection of Winslow Full-Flow Filters for both lube oil and fuel has made possible a record of performance and economy equal to that of engines burning refined fuel. At the left is one unit in the specially designed two-pass system for fuel filtration.

20,000 HOURS OPERATION—Parts Replaced ONLY $300

CP* FILTRATION

Winslow patented CP* (Controlled Pressure) elements are designed to continuously self-adjust the pressure within the filter and allow for a full stream of filtered oil without opening by-pass valves. This is accomplished through the dual flow capacity, with two types of material.

After 20,000 hours operation in a three-year period, the first Nordberg Diesel in a Trans Mountain Pipe Line station was recently overhauled. In spite of the use of crude fuel, and difficult operating conditions, the engine was in such good condition that only $300 worth of replacement parts was required. This is another striking example of the long engine life and the substantial savings in overhaul time and replacement costs when dirt, acid, moisture and other impurities are removed by Winslow Filters. Standard or special installations of Winslow Full-Flow Filters can give you equal engine economies. Please write for complete information.

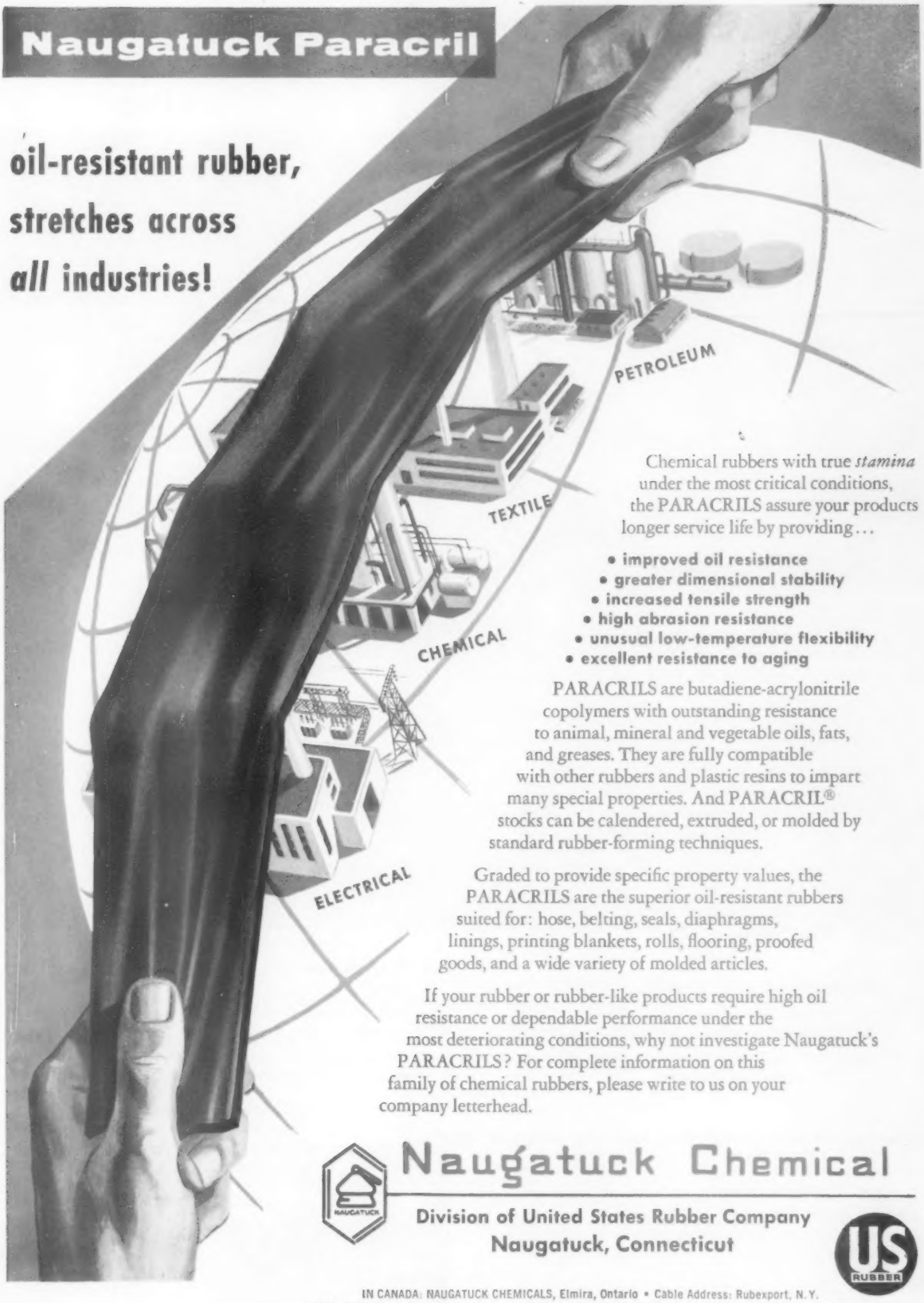
CP is fully protected by patents and trademarks*

WINSLOW ENGINEERING & MANUFACTURING COMPANY

4069 Hollis Street, Oakland, California

Naugatuck Paracril

oil-resistant rubber, stretches across *all* industries!



Chemical rubbers with true *stamina* under the most critical conditions, the PARACRILS assure your products longer service life by providing...

- **improved oil resistance**
- **greater dimensional stability**
- **increased tensile strength**
- **high abrasion resistance**
- **unusual low-temperature flexibility**
- **excellent resistance to aging**

PARACRILS are butadiene-acrylonitrile copolymers with outstanding resistance to animal, mineral and vegetable oils, fats, and greases. They are fully compatible with other rubbers and plastic resins to impart many special properties. And PARACRIL® stocks can be calendered, extruded, or molded by standard rubber-forming techniques.

Graded to provide specific property values, the PARACRILS are the superior oil-resistant rubbers suited for: hose, belting, seals, diaphragms, linings, printing blankets, rolls, flooring, proofed goods, and a wide variety of molded articles.

If your rubber or rubber-like products require high oil resistance or dependable performance under the most deteriorating conditions, why not investigate Naugatuck's PARACRILS? For complete information on this family of chemical rubbers, please write to us on your company letterhead.

Naugatuck Chemical

Division of United States Rubber Company
Naugatuck, Connecticut

US RUBBER

IN CANADA: NAUGATUCK CHEMICALS, Elmira, Ontario • Cable Address: Rubexport, N.Y.
Rubber Chemicals • Synthetic-Rubber • Plastics • Agricultural Chemicals • Reclaimed Rubber • Latices

the BUCYRUS ERIE 30-B

Big work output and operating efficiency you can depend on . . . YEAR AFTER YEAR

Here's a brand new 1-yd. profit-maker for you — the Bucyrus-Erie **30-B**. Offered with either crawler or rubber-tired carrier mounting, it's readily convertible to various front ends — shovel, dragshovel, dragline, crane, or clamshell.

New . . . fast . . . quality-built, the **30-B** is just what you need for quick, dependable handling of your refinery maintenance work. Check the brief rundown of features given below; then request full details.

Matched to your needs

- Your choice of diesel, gasoline, or single-motor electric power. Direct or torque converter drive.
- Five easily-converted front ends — shovel, dragshovel, crane, dragline and clamshell.
- Your choice of five crawler mountings *plus* Transit Crane on rubber-tired carrier.
- Extra equipment for special jobs — independent propel, third drum unit, and cathead.

Designed to out-perform

- Easy, air control for smooth, big-output working cycles.
- Easy to service — automatic lubrication of many parts.
- Large, cool-running clutches and brakes.

Built to outlast

- Six conical hook rollers distribute loads evenly between upper and lower works to save wear.
- Five main operating clutches are alike, with parts interchangeable.
- Specially-processed steels add strength and wear resistance.
- Strong, rigid cast revolving frame withstands twisting and bending stresses, maintains machinery alignment.

233E56C

BUCYRUS-ERIE COMPANY
South Milwaukee, Wisconsin

BUCYRUS-ERIE COMPANY
South Milwaukee, Wisconsin

Gentlemen: Please send me details on the new 30-B.

Name _____

Organization _____

Address _____

City _____ State _____

233E56C

Send for complete facts NOW!

It takes a complete team to keep dependable drilling mud service available for you

Meet This Magcobar Man, the Flying Mud Engineer . . . whose plane is his office, workshop and laboratory

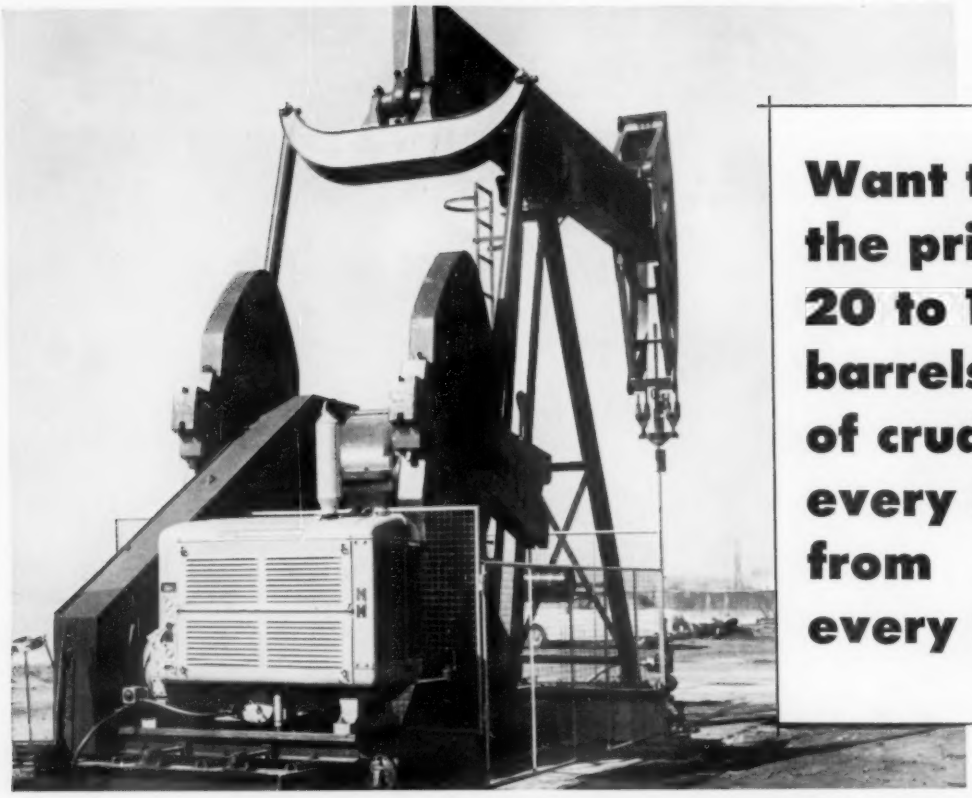
When you call a Magcobar Mud Engineer his first job is to get there fast — and he makes it his business to do just that. Along the Gulf Coast, there is a fleet of fast Magcobar float planes, piloted by Mud Engineers, to serve water locations. These laboratory-equipped planes serve as "home," office and workshop. Other Magcobar engineers use cars, trucks, boats, or walk, if that's the only way to get there. Wherever your drilling location is, in North America, there is a Magcobar Mud Engineer and a Magcobar dealer who combine to give you fast, efficient mud service at your rig.

When you need mud, or mud service, call Magcobar. You'll get the most complete service and finest quality drilling fluids in the oil fields.

Magcobar
Complete
DRILLING MUD SERVICE

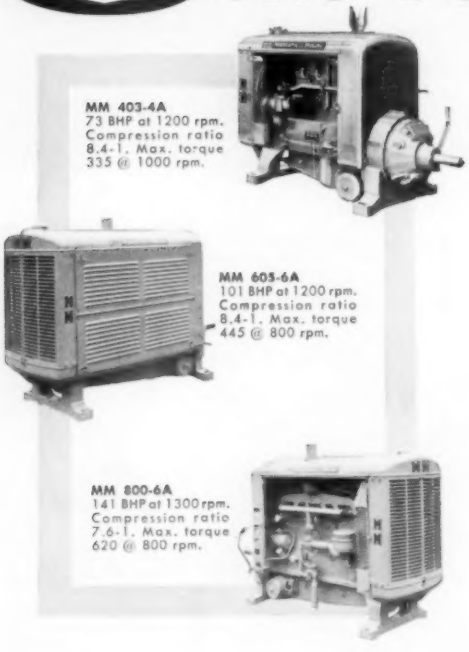
MAGNET COVE BARIUM CORPORATION

Houston, Texas



Want to save the price of 20 to 100 barrels of crude . . . every month from every well?

IF YOU PUMP EXTRA BARRELS TO PAY POWER AND STANDBY CHARGES IT'S TIME TO SWITCH TO MM GAS-FUELED ENGINES



MM 403-4A
73 BHP at 1200 rpm.
Compression ratio
8.4-1. Max. torque
335 @ 1000 rpm.

MM 603-6A
101 BHP at 1200 rpm.
Compression ratio
8.4-1. Max. torque
445 @ 800 rpm.

MM 800-6A
141 BHP at 1300 rpm.
Compression ratio
7.6-1. Max. torque
620 @ 800 rpm.

Actual cost comparisons show that producers pumping with gas-fueled engines save the equivalent of 20 to 100 barrels of crude a month over wells pumped by electric motors. At $2.00 a barrel, that's an *extra* profit *from every well* of up to *$200.00 a month!*

Figure it for yourself! Compare a natural gas cost of 15c per MCF as against an electric power rate of 1c per KWH. Compare maintenance costs established by operators on electric and natural gas installations. Your own figures will prove gas-fueled engines are the most profitable pumping power you can use!

Minneapolis-Moline long-run design helps you get the maximum in gas engine economy. Large piston displacement, moderate rpm, vacuum crankcase ventilation, thermostatically-controlled by-pass cooling, and Thermo-Clad base pans for top-to-bottom temperature control give you the all-time low in pumping costs.

Pocket the price of 20 to 100 barrels of crude—contact your MM oil field distributor. Ask for complete performance data on the nine MM natural gas engines ranging 20 to 291 hp.

INDUSTRIAL POWER DIVISION

MINNEAPOLIS-MOLINE Minneapolis 1, Minnesota

THE GOLDEN POWER LINE

DISTRIBUTED BY

SECO

SHRIMPTON MANUFACTURING & SUPPLY CO.

OKLAHOMA CITY
Tel. JAckson 5-0225

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Tel. RAymond 3-6549

ODESSA
Tel. FEderal 7-4088

KILGORE
Tel. 4311

GLENDIVE

TRETOLITE COMPANY
FEP-95
SAINT LOUIS · LOS ANGELES

shipping crude oil to Europe?

make sure that it arrives ready for refining... with TRETOLITE FEP-95

FEP-95 will treat crude oil in transit. It prevents contamination of crude by sea water and promotes the separation of residual B. S. and W.

FEP-95 has a long record of successful commercial applications in fuel oil transportation service by preventing fuel oil-sea water emulsification often caused by the presence of residual ballast water. In addition to its applications as an emulsion preventive and demulsifier, it has also been used effectively as a desalting agent.

Many European refineries have been designed to refine low-salt Middle-East crudes. The Suez Canal crisis now makes it highly impractical to rely on obtaining low-salt crudes. Why not ensure smooth refinery operations by improving the quality of the crude during shipment?

For further information on Tretolite FEP-95, call or write to

TRETOLITE COMPANY
A DIVISION OF PETROLITE CORPORATION
369 Marshall Avenue, St. Louis 19, Mo. • 5515 Telegraph Road, Los Angeles 22, Calif.

NOTE: If conditions prevent treatment in transit, Tretolite FEP-95 can be injected into the crude as the tankers discharge cargo at destination. The FEP-95 treats the crude as it is pumped into the tanks; the free water settles out during storage.

If you treat with FEP-95 in transit, care should be exercised so that separated water and B. S. & W. are not picked up in the discharge lines and re-mixed.

Chemicals and Services for the Petroleum Industry

DESALTING • DEMULSIFYING • CORROSION INHIBITING • SCALE PREVENTING
FUEL OIL ADDITIVES • WATER DE-OILING • METAL DEACTIVATORS

FEP-57-1

Frank Watts, left, veteran store manager for an independent distributor, having a branch at Bay City, Tex., and H. P. (Pat) McGuirt, tool pusher for Otis Russell Drilling Co., watch Pittsburgh Seamless casing being unloaded at a rig near Damon, Tex.

Oil Field Emergencies Demand Quick Action

It's shortly after midnight as Frank loads a swedge from his store for delivery to the Damon well.

Once he's at the well, Frank sits down in the bunk house with Mr. McGuirt to go over an order for delivery the next day.

Here's Why You Can Rely On Pittsburgh Steel's Independent Distributors

The telephone shrilled at 4 a.m. in the Bay City, Texas home of Frank Watts.

An oil driller in distress was phoning his independent distributor on Christmas Day.

The oil man told Frank he needed a small valve immediately to keep his rig in operation, Christmas or no Christmas.

Frank, a veteran supply man and manager of an independent supply company store, was on his way quickly. He opened his store, got the valve, delivered the item to the worried driller and made it back home in time to watch the kids open their gifts at 8 a.m.

As one of the independent distributors representing Pittsburgh Steel Company, Frank knew the importance of the driller's call. Answering oil field SOS's is an old story to the Watts family.

Not every holiday is disrupted but these SOS's are frequent enough that his wife recalls any number of times when Frank has shown up at dawn due to similar emergencies. For example, there was the night when he made a round trip to Houston (180 miles) for $12.00 worth of parts he was temporarily out of and which were badly needed on a rig.

At 36, Frank Watts is a tall, raw-boned, friendly man the movies would cast as a typical Texan. But more important, he's an oil field businessman, a representative of one of the 18 independent distributors (listed at right) handling Pittsburgh Seamless. And he has nearly 15 years of experience under his belt.

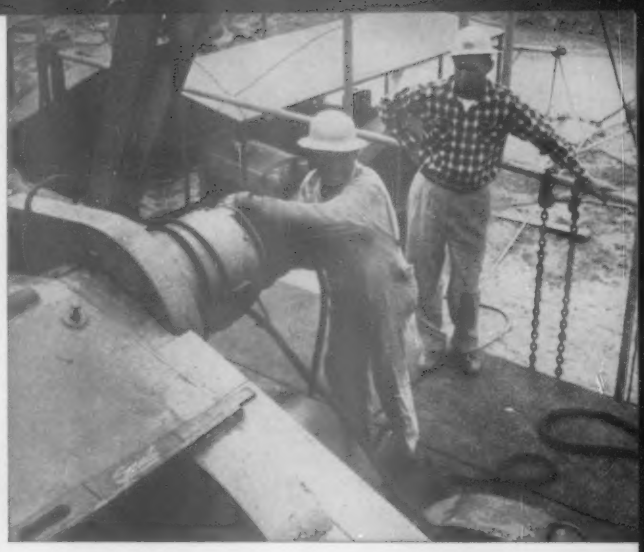
He is accustomed to working 65 hours a week and it doesn't bother him to get frequent night calls, half of them to open his store so a driller can get an item he needs, the other times an SOS for delivery of supplies to keep a drilling operation going.

Frank Watts has "service" as his first and strongest business byword. Quality of the products he handles is a close second. As he puts it:

"I learned a long time ago that service and the best products available are the keys to profit and success in this supply business.

"If we handle only good quality stuff, proven material the men at

An oilman's assurance of quality—Pittsburgh Seamless—is the topic of this conversation Frank is holding at the well-site.



Frank watches cat-heading of Pittsburgh casing as it is run into hole. Frank's company handles a full range of Pittsburgh Drill Pipe, casing and tubing.

the rigs can rely on, and give them all the service they need, we'll get their business and we'll keep it."

Those words stand as testimony to the quality of Pittsburgh Steel Company's drill pipe, casing and tubing. The company Frank works for handles only Pittsburgh drill pipe, although it offers several manufacturers' casing and tubing.

They prove, too, why the independent supply house has become such a vital force in the oil and gas fields.

Independent distributors are ready for action around the clock. Frank's store stocks nearly 3,000 different items ready for delay-free normal operation or for emergencies.

An independent distributor's service is flexible. The independents are personal friends to the oil men they serve. Through their long experience, they know the problems oil men face and can meet their requirements without red tape and extra paper work. They are free from remote control and can make big decisions without wasting time. The independent store is usually the first in an oil field and the last to leave, if it ever does. Its personnel live in the area their stores serve. Their own personal futures are tied to the success they generate for themselves.

Independent distributors help keep costs low. Though they specialize in service, their prices are competitive. Their livelihood depends on meeting competition. Almost with no exception, the independent's representative will stay in the area of his store, not move on every couple of years. The money the independent makes stays where he makes it.

The independent offers only the best in equipment because he buys only what he wants to buy. He is free to select from the best equipment made. Pittsburgh Steel and all the other reputable manufacturers back up the independent distributor.

Independents are the most accessible suppliers in the oil fields. For example, Pittsburgh Steel's distributors have a total of 140 stores in all parts of the oil and gas fields.

Next time you buy drill pipe, casing or tubing use the team that can't be beat: Pittsburgh Seamless and your independent distributor.

Distributor Home Offices

Bradford Supply Company
130 Main Street
Bradford, Pennsylvania

Buckeye Supply Company
18 Harrison Street
Zanesville, Ohio

C. W. Cotton Supply Company
Utica National Bank Building
Tulsa 5, Oklahoma

Franklin Supply Company
624 South Michigan Avenue
Chicago 5, Illinois

Houston Oil Field Material Co.
1524 Maury Street
Houston, Texas

Industrial Supply Company
500 Eighth Street
Wichita Falls, Texas

Iverson Supply Company
400 West Fifth Street
Tulsa, Oklahoma

Lucey Export Corporation
233 Broadway
New York 7, New York

Lucey Products Corporation
624 South Cheyenne
Tulsa 19, Oklahoma

McJunkin Corporation
P. O. Box 513
Charleston 22, West Virginia

Midland Supply Company
Box 3105
Washington St. Station
Wichita 7, Kansas

Mountain Iron & Supply Co.
100 Rule Building
Wichita 2, Kansas

Murray Brooks, Incorporated
P. O. Box 855
Lake Charles, Louisiana

Producers Supply & Tool Co.
706 Commercial Standard Bldg.
Fort Worth 2, Texas

Rodman Supply Company
P. O. Box 2752
Odessa, Texas

Southwest Supply Company
1720 Oliver Building
Pittsburgh, Pennsylvania

Superior Iron Works & Supply Co.
P. O. Box 1800
Shreveport, Louisiana

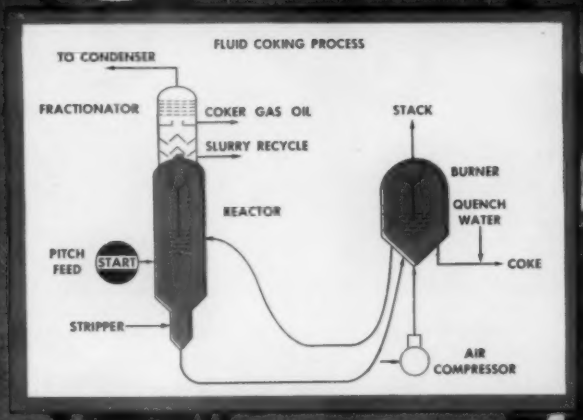
Western Supply Company
424 North Boulder Avenue
Tulsa 1, Oklahoma

Pittsburgh Steel Company

Grant Building • Pittsburgh 30, Pa.

District Sales Offices

Atlanta	Columbus	Detroit	New York	Tulsa
Chicago	Dallas	Houston	Philadelphia	Warren, Ohio
Cleveland	Dayton	Los Angeles	Pittsburgh	



3800 B/D UNIT OF CANADIAN PETROFINA LTD., POINTE-AUX-TREMBLES, CANADA

FLUID COKING GIVES YOU MORE VALUABLE PRODUCTS FROM HEAVIEST RESIDUA

Esso Research and Engineering Company offers you *Fluid Coking*, the first successful fully continuous process for converting low value pitch into valuable lighter products. *Fluid Coking* actually handles the heaviest feed that can be pumped.

It results in a higher percentage of gas oils, and makes possible greater ultimate yields of good quality heating oil and gasoline, and smaller amounts of coke than any coking process ever developed. *Fluid Coking* is another achievement of the Esso Research program — 38 years of new process developments made available to refiners around the world.

Investment and operating costs are lower. "Fluidized coke" by-product is used as public utility fuel and in the smelting industry; other new and more valuable outlets have been developed.

Five *Fluid Coking* installations are on stream; three more will be completed during 1957. Licensees enjoy benefits of continuing *Fluid Coking* research. Flexible *Fluid Coking* can play an important part in helping you process heretofore uneconomical crudes and maintain your refinery balance. We would welcome your inquiry.

ESSO RESEARCH AND ENGINEERING COMPANY

15 West 51st Street, New York 19, N. Y.

Your key to progress... an Esso Research process

Why this pile of sand means lower drilling costs for a South Louisiana operator

The sand in this picture is part of nearly 1500 barrels that a Dorrco D-Sander removed from the mud in drilling one well in South Louisiana. Notice the sharpness of the cliff-like edges which show that the D-Sander not only removes coarse sand but also a great deal of silt and drilled clay solids.

As a result of this, pump parts last longer, bits drill faster and last longer, drilling time is reduced and the cost of mud chemicals is lower.

In one series of controlled comparisons a Dorrco D-Sander saved an average of more than 5,000 dollars per well. Because of savings like this, more and more contractors are installing Dorrco D-Sanders as standard equipment on all their rigs.

Write for Full Information.

SWACO

SALT WATER CONTROL Inc.

A Sid Richardson Development Company

1211 Ft. Worth National Bank Phone: ED 2-4434 Ft. Worth, Texas

GAUGE HATCHES
Available for cone roof, floating roof and low pressurized storage tanks, featuring positive tightness, automatic closure, and resilient cover seal.
FREE VENTS
Sturdy, screened units that provide unimpeded free flow of air and vapor in and out of tanks.
BREATHER VENTS
For low pressure storage of both the working and emergency type, incorporating diaphragm seals for positive tightness.
ANNOUNCING
Wheaton
precision
TANK FITTINGS
WATER DRAIN VALVES
New designs incorporate steel bodies, with resilient seats.
AUTOMATIC TANK GAUGES
Incorporate Neg'ator spring in gauge head with high visibility tape with new design tubular float. Applicable to all low pressure storage tanks.

Precision is the hallmark of Wheaton Tank Fittings — developed through 65 years experience in the manufacture of equipment for the handling of petroleum and chemical products. Wheaton Precision is your assurance of quality. *Send for Catalog No. 66, which illustrates and describes the complete line of Wheaton Tank Fittings.*

WHEATON BRASS WORKS, UNION, N. J.

Manufacturing licensees in Canada, England, Germany, Sweden, France, Brazil, Australia, South Africa.

Tank Fittings by Wheaton

the best by every standard

EQUIPMENT MEN . . . in the News

McCullough Tool Appoints DuBose in Louisiana

W. J. DuBose has been appointed district logging engineer for southern Louisiana with headquarters in New Iberia for McCullough Tool Co. DuBose joined the company in January 1956, as a sales engineer at Harvey. He is responsible for coordinating the company's radiation well-logging studies in southern Louisiana. He also will be available to advise geologists, engineers, and operators in their well-completion programs.

McLemore Elected President of Otis

Robert H. McLemore (center) has been elected president of Otis Engineering Corp., Dallas, Tex., and its subsidiary companies. H. C. Otis, president (right) and founder of the 30-year-old firm, was elected to a newly created position of chairman of the board of directors. Herbert C. Otis, Jr., formerly executive vice president and secretary of the corporation, was elected first vice president and secretary.

Bolger Retires, Names Butler as W. C. Norris Head

William L. Butler has been elected president of W. C. Norris, Manufacturer, Inc., according to an announcement made by E. C. Bolger, retiring president. Butler joined W. C. Norris in 1935. He was executive vice president before his election as president.

W. L. BUTLER

E. C. BOLGER

Bolger was president of the company during the years 1946 through 1956. He joined W. C. Norris after his release from the U. S. Navy where he served as lieutenant commander during World War II. His resignation became effective December 31, 1956.

Other officers of the company are G. W. Davidson, vice president, sales, R. A. Colgin, vice president manufacturing, and Charles Huffman, secretary-treasurer.

W. C. Norris was founded in Tioga, Pa., in 1882 and since then has grown to be one of the largest manufacturers of oil-producing equipment. In 1957 the firm will celebrate its 75th anniversary. The company has been located in Tulsa since 1910. They will shortly announce completion of a new sucker-rod manufacturing plant at West Tulsa. During the past year W. C. Norris announced the purchase of a line of O-ring butterfly valves from Mud Products, Inc.

Moore Joins Rawson As Sales Engineer

Robert E. Moore has joined Rawson & Co. of Houston as a sales engineer. He was with Shell Chemical Corp. for 7 years before shifting to Rawson. The company represents Petro-Chem Development Co., Ralph N. Brodie Co., United States Gauge Division, and other equipment for processing plants.

New Vessel Powered By Stewart & Stevenson

Stewart & Stevenson Services supplied the power plant for a new 127-ft. boat for offshore work. The boat is owned by P. W. Curry and Hugh E. Jackson. It was built by Weaver Shipyard in Orange, Tex. The boat's power plant is two tandem 6-110 G.M. diesel engines and two 30 kw. Stewart & Stevenson generator sets. It is named after Donald Stevenson, president of Stewart & Stevenson, and will serve as a crew boat, for towing, and for hauling pipe and mud.

Welex Opens New Shreveport Office

James E. Stough is manager of a new district office and operating branch for Welex Jet Services, Inc. The office is located in Shreveport, La., and will offer the company's line of jet perforating and associated services to northern Louisiana, East Texas, and southern Arkansas. J. B. Vaughan, vice president, made the announcement.

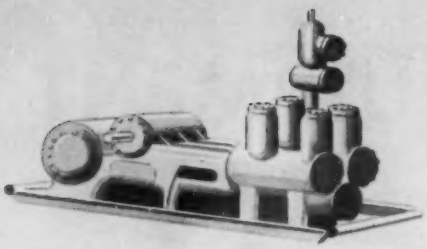
J. E. STOUGH

J. W. JORDAN, JR.

Stough moved to the new office from the company's Beaumont district where he had been manager. John W. Jordan, Jr., is assistant manager. He moved from Odessa, Tex., where he had been a sales engineer.

Mission's Sharp Becomes Houston Bank Director

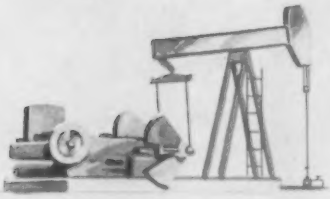
W. Bedford Sharp, president and chairman of the board of Mission Manufacturing Co., has been elected to the board of directors of Houston Bank & Trust Co. Sharp served as consultant and adviser to the petroleum division of the Economic Cooperation Administration (Marshall Plan)

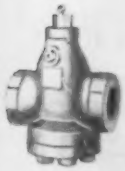


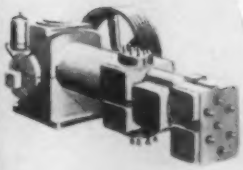
WORKING for YOU

–18 stores–with men and supplies–located to best serve you in Texas and Louisiana.

–'Round the clock' service ready to meet your needs with "what you want–when you want it."







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TEXAS: Alice, Corpus Christi, Victoria, McAllen, Bay City, Columbus, Barbers Hill, Liberty, Beaumont, Kilgore, Odessa. LOUISIANA: Lake Charles, New Iberia, Houma, Harvey, Shreveport. NEW MEXICO: Hobbs.

SALES OFFICES

DALLAS SHREVEPORT SAN ANTONIO
TULSA NEW ORLEANS LAKE CHARLES
CORPUS CHRISTI MIDLAND

WILSON SUPPLY CO
HOUSTON, TEXAS

in Paris, France, during 1948-49. He is also chairman of the board of Mission Manufacturing Co., Ltd., of England, and of Compania Anonima Maquinaria Petrolera, in Venezuela.

National Supply Promotes Reinarz and Cordrey

A. R. Reinarz has been promoted to chief engineer and Richard N. Cordrey has been promoted to assistant

A. R. REINARZ

R. N. CORDREY

chief engineer at the Toledo, Ohio, plant of National Supply Co.

Reinarz joined the the company in 1937. He was transferred to Toledo in 1954 as administrative engineer.

Cordrey started with the company in 1944 and has worked with development and production on the company's drilling rigs.

York Heads New Office Of Right-of-Way Firm

Holly E. York, vice president, is in charge of the new Tulsa office of Coates Field Service, Inc. The company was founded in 1950. It serves as a contractor to buy right-of-way for oil, gas, and electric-transmission companies. It also settles construction-damage claims that occur as the result of right-of-way construction.

Williams Brothers Buys Fifty-Seven Mobile Homes

Williams Brothers of Tulsa has taken delivery of 18 of the 57 custom-built mobile homes built by Spartan Aircraft Co., Tulsa. The mobile homes will house U. S. and British employes during construction of tank farms and pump stations for the government of Turkey.

The recent delivery consisted of 2 superintendent homes, 2 diner-recreation units, 2 kitchen units, 2 toilet-shower-laundry trailers, and 10 sleeping units. Five men can be housed in

W-S Forged Steel Fittings

Now protected with...

new blue rustproof coating

That attractive color you see on our forged carbon steel fittings is a new synthetic coating that effectively protects the fittings against corrosion in stock and in service. The coating completely covers the fittings—inside and outside, thus protecting threads and sockets, as well as external surfaces.

If you are going to paint your piping system for color coding or other reasons, the new coating serves as an excellent base for paint. No objectionable rust or scale to scour off before painting.

All W-S forged carbon steel fittings, in both screw-end and socket-welding types, are now available with the new blue rustproof coating.

Remember the blue color. It labels the fitting a W-S Quality Product.

Send for your copy of Forged Steel Fittings Catalog A-3-56

Write to W-S Fittings Division, H. K. Porter Company, Inc., P.O. Box 95, Roselle, N. J.

HKP W-S FITTINGS DIVISION
H. K. PORTER COMPANY, INC.

Allis-Chalmers dozers

Here a 94-belt hp, 24,800-lb. HD-11 dozes out a slush pit. By pulling one lever, operator can shift from any of the six forward speeds to any of the three reverses. By using the high-speed reverse, he can back up in a hurry—convert maneuvering time to production time.

hog dirt out quick on oil field jobs

Ramming out slush pits, leveling drill sites, carving access roads, building fire walls—whatever the job, you get high production with an Allis-Chalmers crawler tractor-dozer package.

Here is why. Because each dozer is designed specifically for the tractor it mounts on, you get a unit that is exactly the right size with maximum strength without excess weight. Dozer is mounted in the right location to provide a balanced tractor-dozer package with high dirt-moving ability under any terrain or job condition.

Proper blade curvature keeps dirt "live" and rolling for bigger loads with less tractive effort. Specialized grading and sloping jobs are handled accurately with easy-operating pitch and tilt adjustments.

Allis-Chalmers dozers are tough

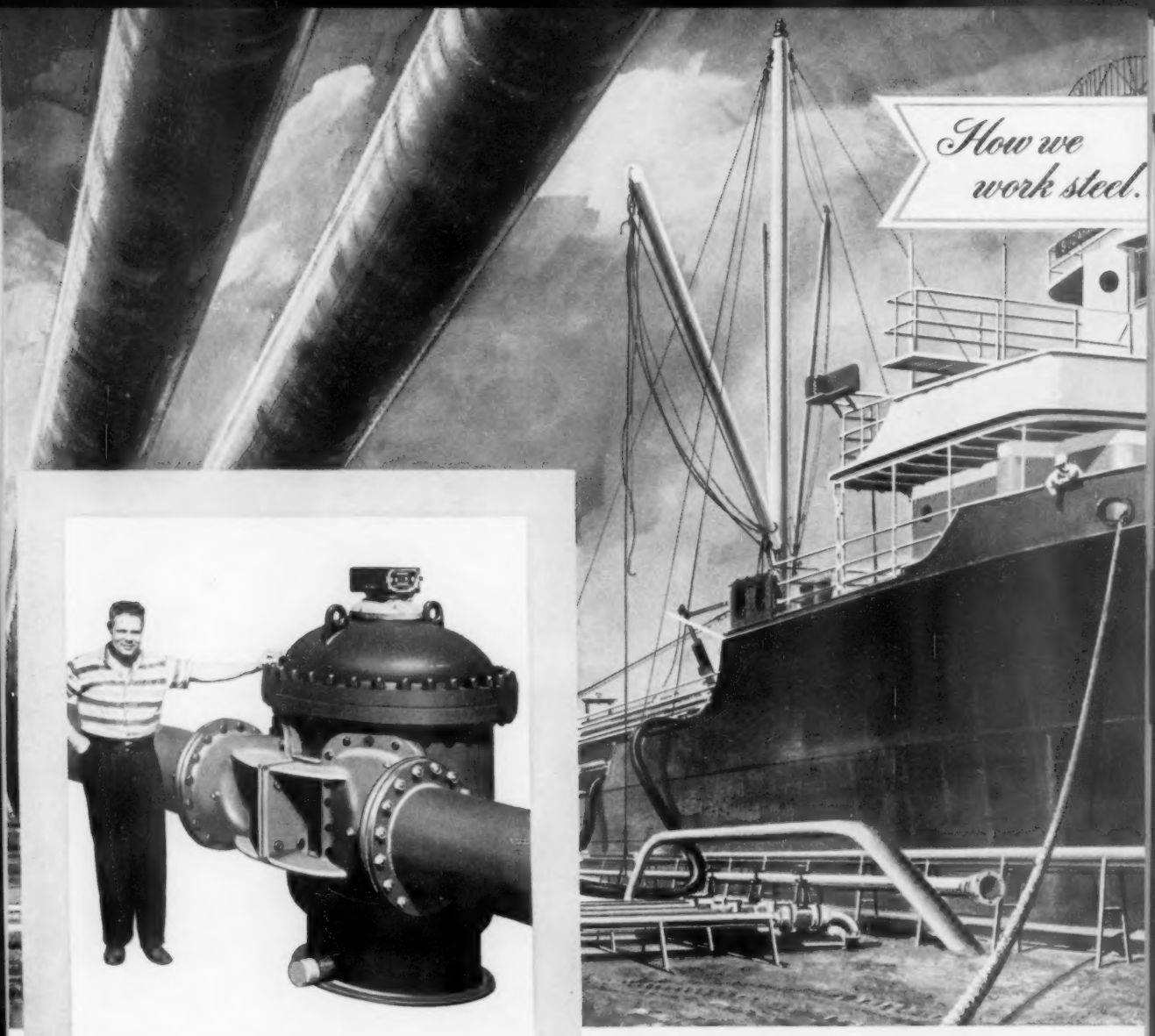
These long-life dozers are the product of the latest design and manufacturing techniques. Automatic electric welding, line boring of brackets, and proper reinforcing assure lasting alignment. All possible points of wear—trunnions, pin connections, ball and socket joints—are hardened to keep the dozer "tight" even after long hours of hard work.

Matched to a great new crawler line

Allis-Chalmers crawlers are designed to give you big-money dirt-moving performance. New, powerful Allis-Chalmers engine, all-steel Box-A Main Frame, unit component construction, new ceramic-lined master clutch, new extra-tough track are just a few of the reasons why. Your nearby Allis-Chalmers dealer can point out many more.

ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION, MILWAUKEE 1, WISCONSIN

ALLIS-CHALMERS



force-feeding an oil tanker at up to 315,000 gallons per hour...

New petroleum-metering goliath measures a barrel with every gulp

They just don't come any bigger — or any more accurate — than the giant new A. O. Smith B-700. Another example of A. O. Smith research that paces progress—it's the world's largest rotary positive-displacement meter . . . rings up a barrel (31½ gallons) with every revolution. Ideal teammate for the king-size pumps that can fill or empty a modern tanker's vast holds at up to 10,000 barrels an hour.

For all its size and capacity—B-700 offers the sure dependability and never-miss-a-drop accuracy that have made A. O. Smith meters famous throughout the petroleum industry. From oil field to refinery, from pipe line to tank truck, from loading dock to service station — A. O. Smith meters measure the flow precisely, reliably . . . year-in, year-out.

Want more facts about the B-700 or other A. O. Smith petroleum meters? Write for free, illustrated brochure.

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12 plants in New Jersey, Pennsylvania, Ohio, Wisconsin, Illinois, Texas and California
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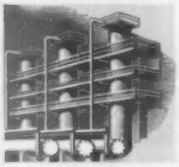
Permaglas home heating and cooling systems

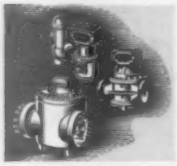
Permaglas and Burkay water heaters

Harvestores for the farm
Permaglas Storage Units for industry

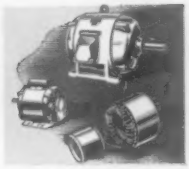


Pressure vessels, heat exchangers

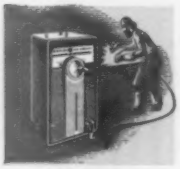
Line pipe, oil well casing



Liquid meters, gasoline dispensers

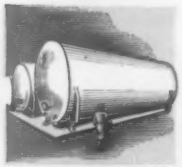


Electric motors



Welding machines, electrodes, accessories

Permaglas smoke stacks



Glass-lined and stainless tanks

Automotive frames and parts

Glascote processing equipment

each sleeper. Williams Brothers will send 13 U. S. and 70 British technicians to Turkey. About 800 personnel will be employed.

De Larzelere and Hale Join Hoil Engineering

Hoil Engineering Co. of Tulsa added Frank P. De Larzelere and A. J. Hale to its sales and service personnel. De

DE LARZELERE

A. J. HALE

Larzelere is with the utility division which manufactures and services gas clarifiers, strainers, and gas scrubbers. Hale is the contact representative. He was formerly associated with Warren-Bradshaw Exploration Co. and Milwhite Mud Sales Co.

Rohrdanz Joins Tellepsen

R. C. ROHRDANZ

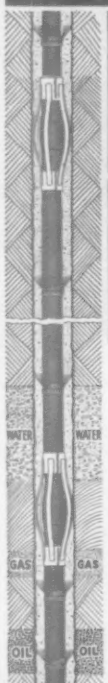
R. C. Rohrdanz has been named assistant construction manager of Tellepsen Petro-Chem Constructors, Houston, Tex. Emory E. Gose, Jr., vice president, made the announcement. Rohrdanz came from Bellco Industrial Engineering Co. He was with Monsanto Chemical Co. before that.

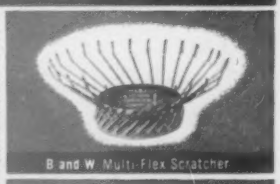
Oil Well Makes Personnel Changes

W. A. Weir, Canadian area manager of Oil Well Supply Division of U. S. Steel, announced the following appointments: Clifford B. Fisher as store manager at Valleyview, Alta.; Allen C. Johnstone as field representative at Drayton Valley, Alta.; James A. Murray as field representative at Estevan, Sask.; Larry B. Kent as field representative at Estevan, Sask.; William B. Fisher as field representative at Okotoks, Alta.; and the transfer of James A. Groves, field representative, from Drayton Valley to Valleyview, Alta.

Clifford Fisher was located at Drayton Valley, Alta. Johnstone was em-

B and W SCRATCHERS AND CENTRALIZERS



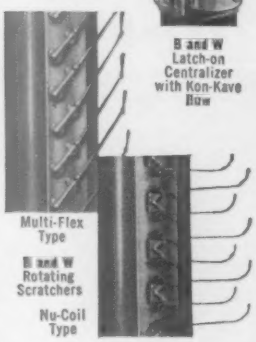


B and W Multi-Flex Scratcher

B and W Hinged Nu Coil Scratcher

B and W Plain Stabilizer

B and W Latch-on Centralizer with Kon-Kave Bow



for a good cement job

Complete field service is included when you specify B and W Scratchers and Centralizers. Our experienced service men, located in all active drilling areas, will install equipment and assist throughout the entire cementing operation.

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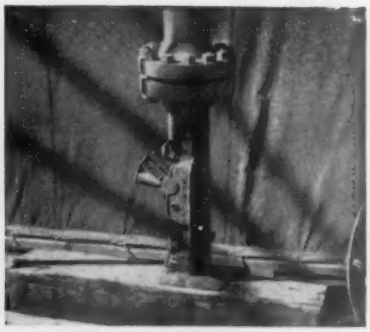
Shortcuts for Drillers
with Simplex Jacks

SOMETIMES IT TAKES TWO . . . With right and left hand toes, respectively, Simplex Nos. 126 and 127 ratchet lowering geared jacks can be used as a pair for lifting and lowering rigs or other heavy equipment. 25-ton capacity on cap or toe. Powerful geared mechanism makes jack faster and easier to use than standard speed types.

BIG PULL . . . For your cable tightening and wire pulling jobs. Here's the Simplex Jack that works fast on slack cables, gives hefty pull for final tightening. No. 324 is light, handy to use.

OTHER SIMPLEX JACKS FOR DRILLERS include the famous "center-hole" Jenny and the Re-Mo-Trol, a remotely controlled ram and puller. There is also a complete line of Simplex hydraulic and screw jacks. General Catalog No. 56 lists them all—write for a free copy.



"THE MUD LINE STANDPIPE WAS POUNDING LIKE *!?*" according to the pumper, "so we jacked it up". This is only one way the versatile Simplex Emergency Jack offers an easy short-cut to problems in the oil country. With 15-tons capacity at four lift points, Model 310A also lifts, skids and levels rigs, moves and braces machinery, pulls positions, clamps and supports pipe.

LIFTS IN A HURRY . . . For extra speed and ease of handling on many heavy duty oil field lifting jobs. Simplex Model 2029 lifts 20-tons on cap *or* toe. Single acting, ratchet lowering lever type.

TEMPLETON, KENLY & CO.
2539 GARDNER ROAD, BROADVIEW, ILLINOIS
A. C. Templeton, 5627 Del Roy Drive, Dallas, Tex.

SET-UP FOR

SPEED and SAFETY

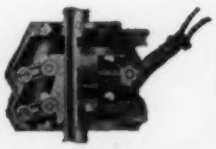
KINZBACH AUTOMATIC TUBING SPIDER

POSITIVE GRIP
AUTOMATIC ALIGNMENT
ONE-MAN OPERATION
FULL SIZE RANGE

The Kinzbach Automatic Tubing Spider handles tubing through 3". It is rated at a 150,000 pound operating load.

For complete information write for Bulletin 23151.

Slip Set. Slip segments are parallel with the centerline of the pipe. Handle is locked in "closed" position.



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ALWAYS IN OPERATION WHEN PUMPS ARE RUNNING

ployed and located in Edmonton, Alta. Murray was transferred to Estevan in 1955 before his appointment. Kent was employed and located at Virden, Man. William Fisher was manager of the Valleyview, Alta., store before his appointment. Groves was employed in 1948 in Houston, Tex., and is the only employe of those mentioned who is not a native Canadian.

G & H Towing Buys New Offshore Tug

The powerful new G & H Towing Co. diesel-tug Ling has been put into service for offshore oil-field towing operations. The picture shows the tug as it hits the water for the first time after christening ceremonies held by the builder, Gulfport Shipbuilding Corp., Port Arthur, Tex. This is the fourth deep-sea tug custom-built for G & H by Gulfport during 1956 and brings the G & H fleet to 22 diesel tugs.

Franklin Supply Transfers Four Men

Mike McEvoy has been transferred to Grayville, Ill., to take over sales and store operations for Franklin Supply Co. W. H. (Bill) Kerin has been transferred to Chicago as manager of stores. Wendell Kalck has been moved to Chicago to the sales department. The moves were announced by Larry Harper, executive vice president of Franklin.

At the same time Jene Harper, Franklin president, announced the opening of a new store in Liberal, Kans. Louis Roter moved from the Odessa, Tex., branch to manage it. Vernon Neal assists Roter. Neal moved from the Grayville, Ill., store.

Panellit Appoints L. G. Good

The appointment of Louis G. Good as manager of the contracting division of Panellit Service Corp. was announced by Neil Blair, vice president and general manager. Good is respon-

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BRIGHT PROSPECT
FOR "PIPE DREAMS"
Drillers' "pipe dreams" are of rugged dependability. Producers' "pipe dreams" are of consistent high quality. Both are dreams of economy. And both could well be dreams of FBT seamless †casing, †tubing or †drill pipe whose in-the-field performance has won praise from qualified oil men. For outstanding service on outstanding tubular goods, contact Texcon for FBT.
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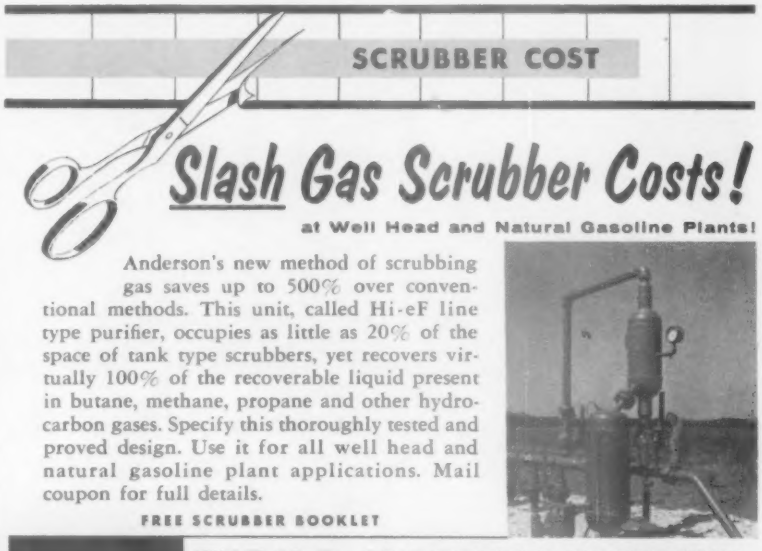
Bank of Commerce Bldg. FBT Houston, Texas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Slash Gas Scrubber Costs!
at Well Head and Natural Gasoline Plants!
Anderson's new method of scrubbing gas saves up to 500% over conventional methods. This unit, called Hi-eF line type purifier, occupies as little as 20% of the space of tank type scrubbers, yet recovers virtually 100% of the recoverable liquid present in butane, methane, propane and other hydrocarbon gases. Specify this thoroughly tested and proved design. Use it for all well head and natural gasoline plant applications. Mail coupon for full details.
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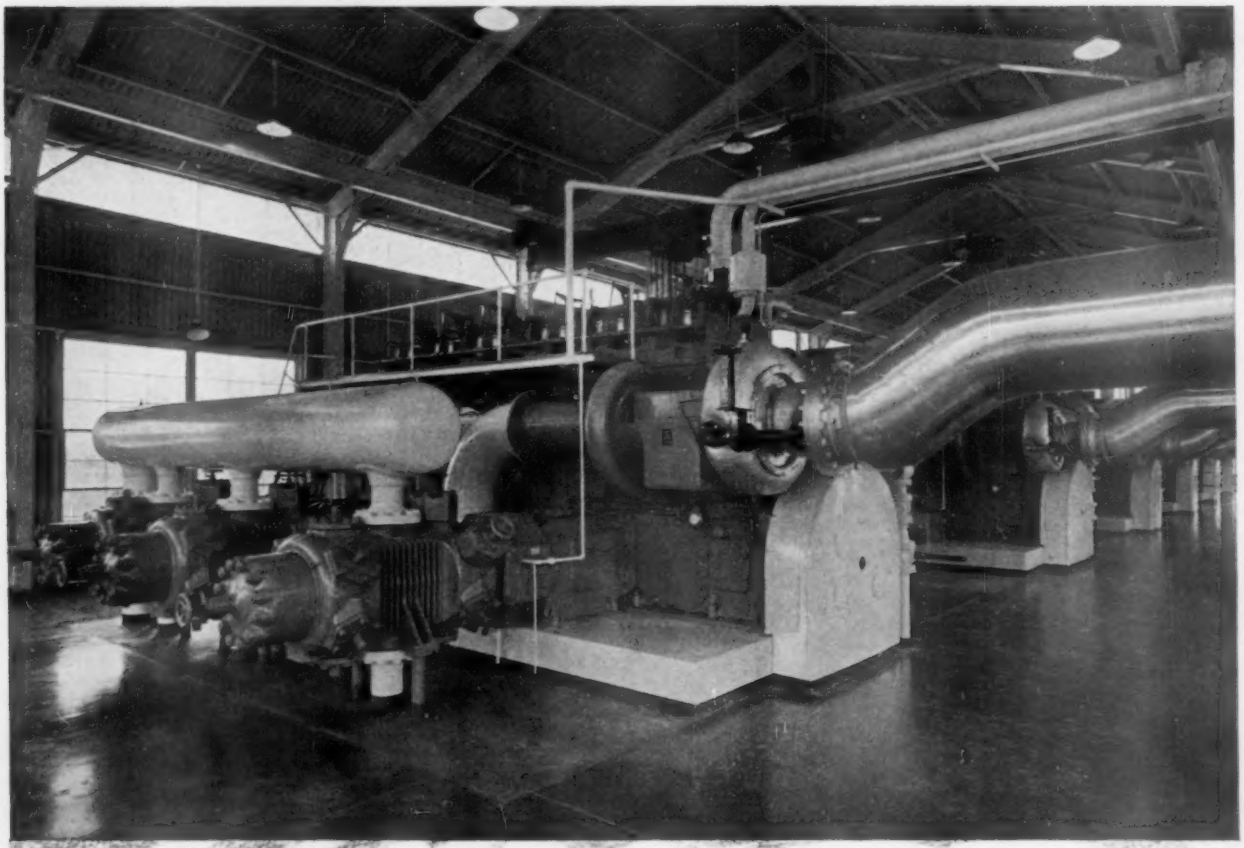
PURIFIERS • SCRUBBERS • SEPARATORS • MIST EXTRACTORS

For Pacific Northwest's...

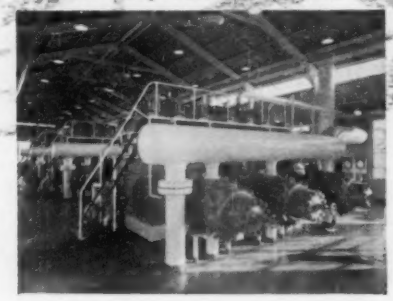
Altitude: 6600'

Station-1. Ignacio, Colorado
Six—2000 bhp. Clark TLA-6 Turbo-supercharged Compressors



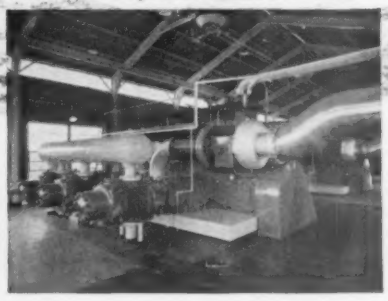
Altitude: 5620'

Station-2. Moab, Utah
Four—2000 bhp. Clark TLA-6 units



Altitude: 6000'

Station-4. Rangely, Colorado
Four—2000 bhp. Clark TLA-6 units



Mile high pipeline

46,000 BHP. of Clark Turbo-supercharged Compressors Furnish Over Half the Main Line Horsepower

Some of the most rugged terrain in the country is covered by Pacific Northwest's 1500 mile pipeline serving the northwestern part of the United States. Twenty-three Clark 2000 bhp. TLA-6 turbo-supercharged compressors supplied over half of the main line horsepower.

With stations operating at elevations of up to 6600′, normally aspirated engines would have required heavy deration. The Clark TLA-6 units, however, operate with substantially less deration because they are turbo-supercharged. (Clark can now supply for its TLA units, as optional equipment, a special turbocharger for high altitude applications which permits sea level ratings. No deration is required.)

Mountain top locations or "down in the flats", the modern Clark turbo-supercharged compressor is the most economical prime mover to install on today's pipelines. They are built in seven sizes ranging from 1100 to 3400 bhp. Your nearest Clark representative will be pleased to give you complete information.

CLARK BROS. CO., OLEAN, NEW YORK
One of the Dresser Industries
Offices in Principal Cities Throughout the World

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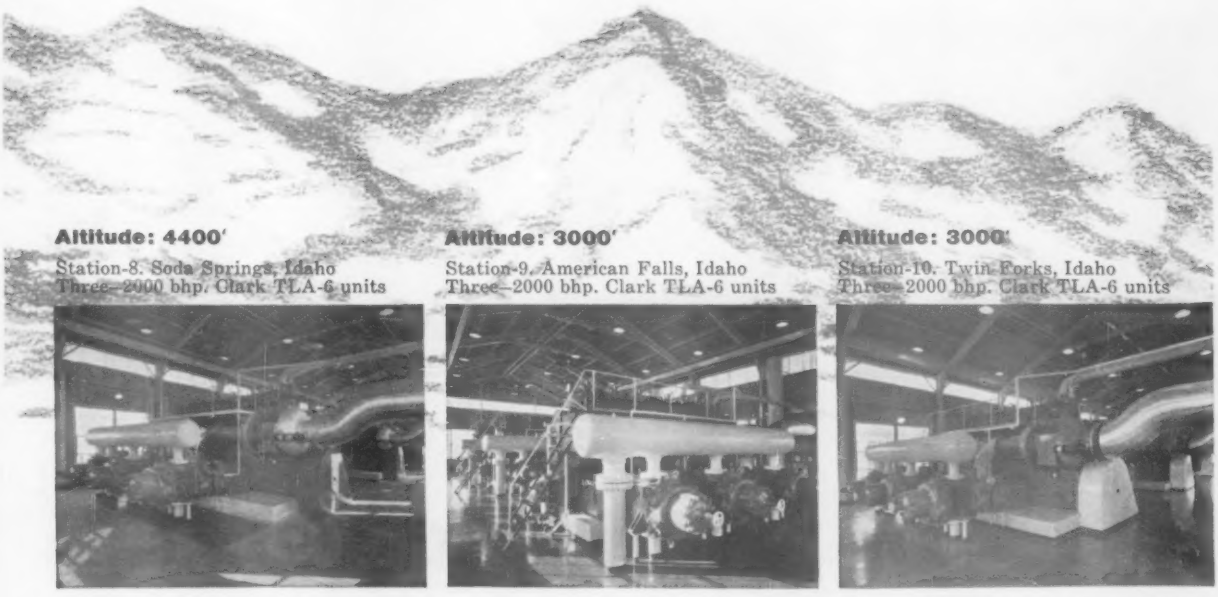
Turbo-supercharged Compressors



Altitude: 4400′
Station-8. Soda Springs, Idaho
Three–2000 bhp. Clark TLA-6 units

Altitude: 3000′
Station-9. American Falls, Idaho
Three–2000 bhp. Clark TLA-6 units

Altitude: 3000′
Station-10. Twin Forks, Idaho
Three–2000 bhp. Clark TLA-6 units

NOTE: All horsepower ratings are based on sea level elevation.

Plus values of Girdler Catalysts...

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MARKET SERVICE
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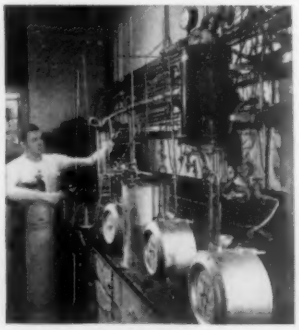
LOOKING FOR LOWER COSTS? Behind each Girdler Catalyst there is a full-scope service, the keystone of which service is Research. Typical of the work of this branch is the constant testing (above) for the proper balance between physical strength and activity of catalysts to provide optimum operating economy. Why not let this service help solve *your* catalyst problems? Write on your company letterhead for booklet which tells in further detail what this service can do for you.

Girdler catalysts and the services that go with them can help cut your costs

HAVE A PROBLEM? This infrared spectrophotometer is typical of the advanced equipment used in Girdler's Analytical Laboratories to help solve knotty problems encountered by our customers and to monitor the quality of our production.



NEED A BETTER CATALYST? Girdler's highly skilled development staff constantly works to create new catalysts or improve existing ones. Result: more production, less cost for Girdler customers.

WANT BETTER RESULTS? Girdler has a staff of well-qualified technical personnel ready to bring you a variety of important catalyst services, including the proper application of Girdler Catalysts to your specific problem. At this "Oxo" plant of Gulf Oil Corporation, Port Arthur, Texas, Girdler catalyst specialists helped increase output 25%.

CATALYST DEPARTMENT

The GIRDLER Company

A DIVISION OF NATIONAL CYLINDER GAS COMPANY

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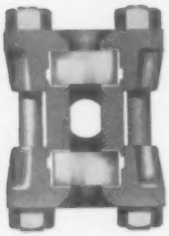
AND
CHEMICAL PLANTS
THROUGHOUT THE WORLD



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sible for the design, field installation, test, and calibration of the company's instrumentation and data-reduction systems.

Wheatley Adds Smartt, Waddock, and McKinney

WADDOCK

DON SMARTT

I. W. McKINNEY

Jerre Waddock, Don Smartt, and I. W. (Dub) McKinney have joined Frank Wheatley Supply Co. of Tulsa as an addition to the sales force. Huber Dye, manager, made the announcement. Waddock was with Fairbanks-Morse. He comes to Wheatley's Tulsa office. Smartt joins the Oklahoma City office. McKinney was with Crutcher-Rolf-Cummings and will cover the Houston area for Wheatley Supply.

Homco Appoints Or Shifts Five

Houston Oil Field Material Co., Inc., announced five changes or shifts. A. N. MacDiarmid became assistant division manager at San Antonio, Tex. He assists C. P. Smith. J. R. Mouser transferred to San Antonio as resident manager. Gerald T. Shoemake is now store manager at Freer, Tex. A. R. King moved to Houston where he is in charge of production-equipment sales. D. M. Rogers is the new store manager at Pearsall, Tex.

Curley Becomes Manager of New Royston Office

W. R. Curley is the new regional manager of a combined sales office serving Texas, Louisiana, Arkansas, and Mississippi for Royston Laboratories. Royston makes mastics and industrial coatings. Curley served several years in the compressor stations and

new book

gives you the facts on

modern
OUTBOARD POWER
for
oil field
service

TODAY there's a *new kind* of outboard power for work boat duty! A complete line of new Evinrude *Aquasonic* models so advanced in capability, stamina, and smooth, quiet operation that they set entirely new standards of performance. Get the facts! Send coupon for booklet.

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DAVIS 210 BACK-HOE

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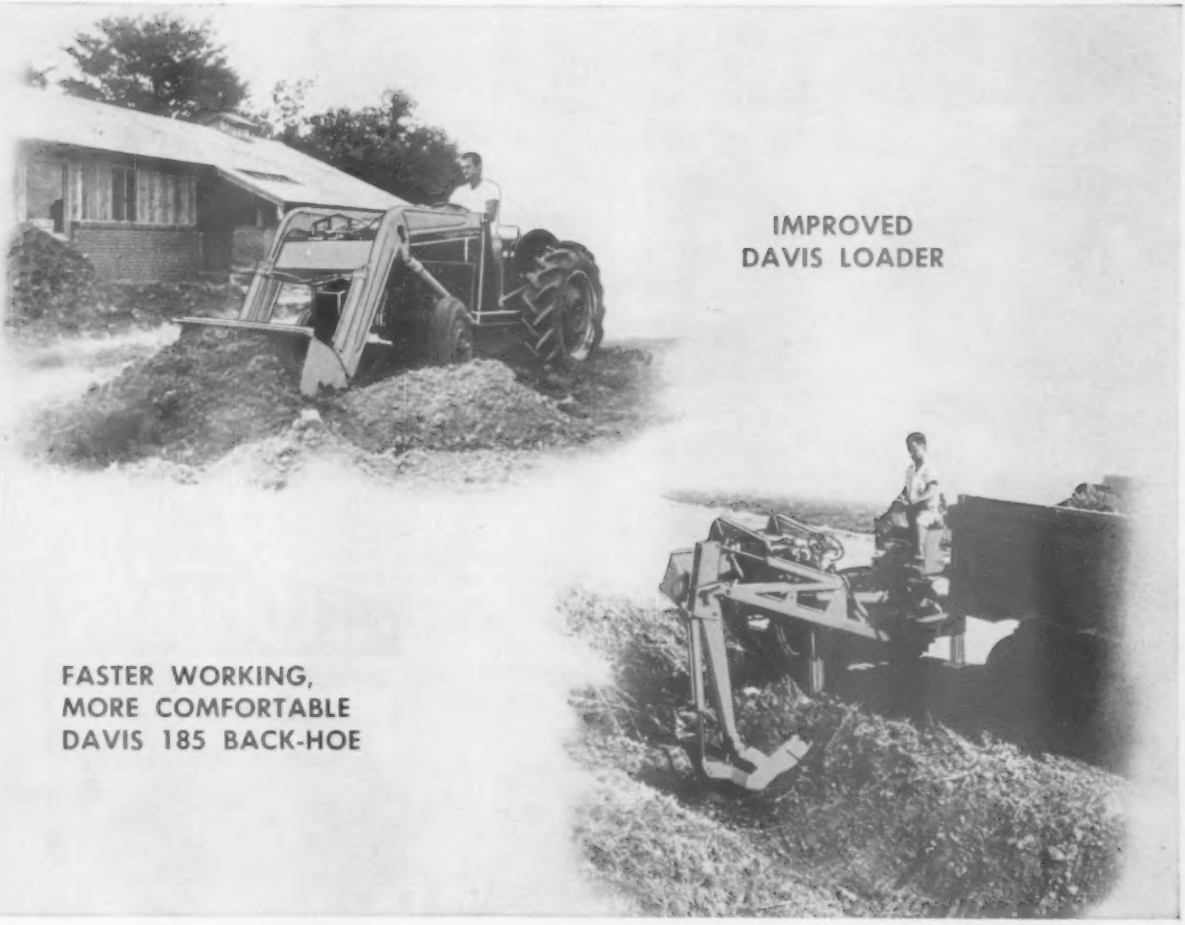
THE EQUIPMENT THAT LEADS THE WAY



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MORE COMFORTABLE
DAVIS 185 BACK-HOE

New Back-Hoes and Loaders for 1957

. . . make More Profits for You!

Here's good news for back-hoe and loader users. Davis opens a whole new era of profits. ***The New 210 Davis Back-hoe*** has three interchangeable mounting points so you can switch digging positions from center to side for flush digging alongside buildings, fences, etc. . . . and an engineering achievement desired by all — but accomplished only by Davis — an exclusive ***hydraulic rotary boom swing cylinder*** that gives smooth, continuous ***200° cushioned operating arc*** without ever changing a pin. Both the new 210 and the popular 185 have 7,000 pounds of breakaway power and an adjustable seat with extended foot rests.

Both models are now available as low-cost, ***truck-mounted units*** for any one-ton or larger flat-bed truck — self-powered, completely detachable, or attached in matter of minutes, and designed to fold into a compact package for easy transporting with everything being accomplished hydraulically. ***The Davis Loader***, already the possessor of more "firsts" than any other make, has also been improved for even better workability. For better profits in 1957 . . . for better equipment in earth moving and material handling, see **DAVIS**, America's premium equipment that sells for competitive prices.

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DO YOU HAVE A TWO-STAGE PRESSURE OR TEMPERATURE CONTROL PROBLEM

MERCOID® HAS THE SOLUTION

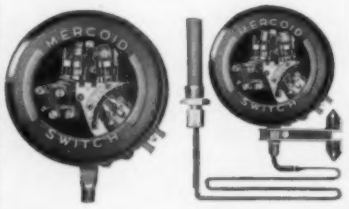
Mercoid DA-400 Series Controls are dual purpose controls (available for pressure or temperature) incorporating a single element operating two separate independently adjustable Mercoid magnetic mercury switches. Circuit arrangements can be supplied for various operations, a few examples are:

1. Close one alarm circuit at high setting and a separate circuit at low setting. Both circuits remain open between the high and low operating points of the two switches.

2. As an electrical interlock to open one circuit on a rise above, and the second circuit on a drop below the set operating point.

3. To provide two-stage control by opening one circuit on a rise and a second circuit on a further rise.

Pressure types available in 17 different operating ranges from 0-30" vac. to 300-2500 psi. *Temperature types* available in 11 operating ranges from -30-60°F. to 370-530°F.



All types are equipped with external adjustments and visible calibrated dial.

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in hydrocarbon and corrosion engineering with Hope Natural Gas Co., Monroe, La.

Goodrich International Promotes Hill

GERALD HILL

Gerald Hill, who was sales manager of Goodrich Industrial Rubber Co., Manila, P. I., has been named manager of industrial products sales for the company. Hill replaces Edward P. Bonazzi, who retired November 1. Hill joined B. F. Goodrich in 1933 as a messenger in the main lobby.

Franklin Opens New Canadian Store

Hal Johnson has been transferred to Estevan, Sask., as branch manager of Franklin Pipe & Supply, Ltd.'s, new store. Johnson came to Estevan from the Edmonton store.

George Pletschet and Bud Walters are store men at the new branch. Pletschet transferred from the Edmonton store and Walters transferred from the pipe department of Franklin Supply Co. in Chicago.

Tube Turns Plastics Names Erich as Sales Manager

EARL ERICH

Earl Erich was appointed as sales manager of Tube Turns Plastics, Inc. Carl B. McLaughlin, executive vice president, announced the appointment. Erich is a corrosion specialist who began as a research chemist for Atlas Mineral Products Co. He joined the technical service staff of Tube Turns Plastics on January 1, 1955. In May 1955 he took over the sales programs on the West Coast and in the Southwest. He became assistant sales manager on January 1, 1956.

Allis-Chalmers Names Two New Area Distributors

Allis-Chalmers industries group announced the appointment of two new distributors in the West-South-Central area.

Electric Service Co. of San Angelo, Tex., has been named a distributor for

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AND PROVEN
IN THE OIL FIELDS

FIELDMASTER
BALL BEARING MOTORS

- VERMIN PROOF
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Oil Industry's Handiest Tool!

Thompson Vacuum Tanks handle liquids and semi-solids in MINUTES instead of hours!

"It's our handiest tool!" That's what they're saying about the Thompson Unitized Vacuum Tank, and once you've tried it, you'll agree. There's absolutely no substitute when it comes to moving liquids and semi-solids in a hurry.

- *Jobs which once took hours are now on the way in minutes.*
- *Jobs which once called for crews are handled by a single driver-operator.*

Versatile vacuum is a real "go-getter" in all departments: refining, drilling, producing and pipeline. Fast pick-up, transport and discharge make the Unitized Vacuum Tank indispensable to modern cost-conscious operations.

Write today for specifications and the name of those in your area who are operating a Thompson Vacuum Tank. See it in action.

THERE IS A THOMPSON UNITIZED VACUUM TANK FOR YOUR NEEDS. CAPACITIES RANGE FROM 20 TO 100 BBL. COMPLETE UNITS CAN BE SKID, TRUCK, SEMI-TRAILER OR TRAILER MOUNTED.

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for accurate metering of compounds
In the oil fields . . . on pipe lines . . . in your power house . . . wherever the metering of various liquids calls for accuracy, you'll find a Manzel. Adjustable from 0 to 1 gallon per minute. Experienced field engineers available for consultation.
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LUBRICATORS • CHEMICAL FEEDERS • SLURRY PUMPS
A Division of Houdaille Industries, Inc

A.-C. transformers in six central Texas counties. These include Tom Green, Irion, Upton, Sterling, Glasscock, and Concho counties.

Electric Supply of Oklahoma, Inc., in Oklahoma City, has been appointed a distributor for A.-C. motors, controls, and transformers in 19 Oklahoma counties. These include Carter, Murray, Stephens, Love, Cleveland, Cotton, McClain, Grady, Caddo, Washita, Canadian, Custer, Blaine, Kingfisher, Logan, Payne, and Oklahoma counties.

Electric Supply of Oklahoma was established in January 1956 and is headed by William Mee. F. D. Ransbarger is sales manager. Electric Service Co. was founded in 1938. A. R. Schanta is manager and W. W. Jackson is sales manager.

Four Wheel Drive Names Sales Executives

V. M. ANDERSON

FRED A. BROWN

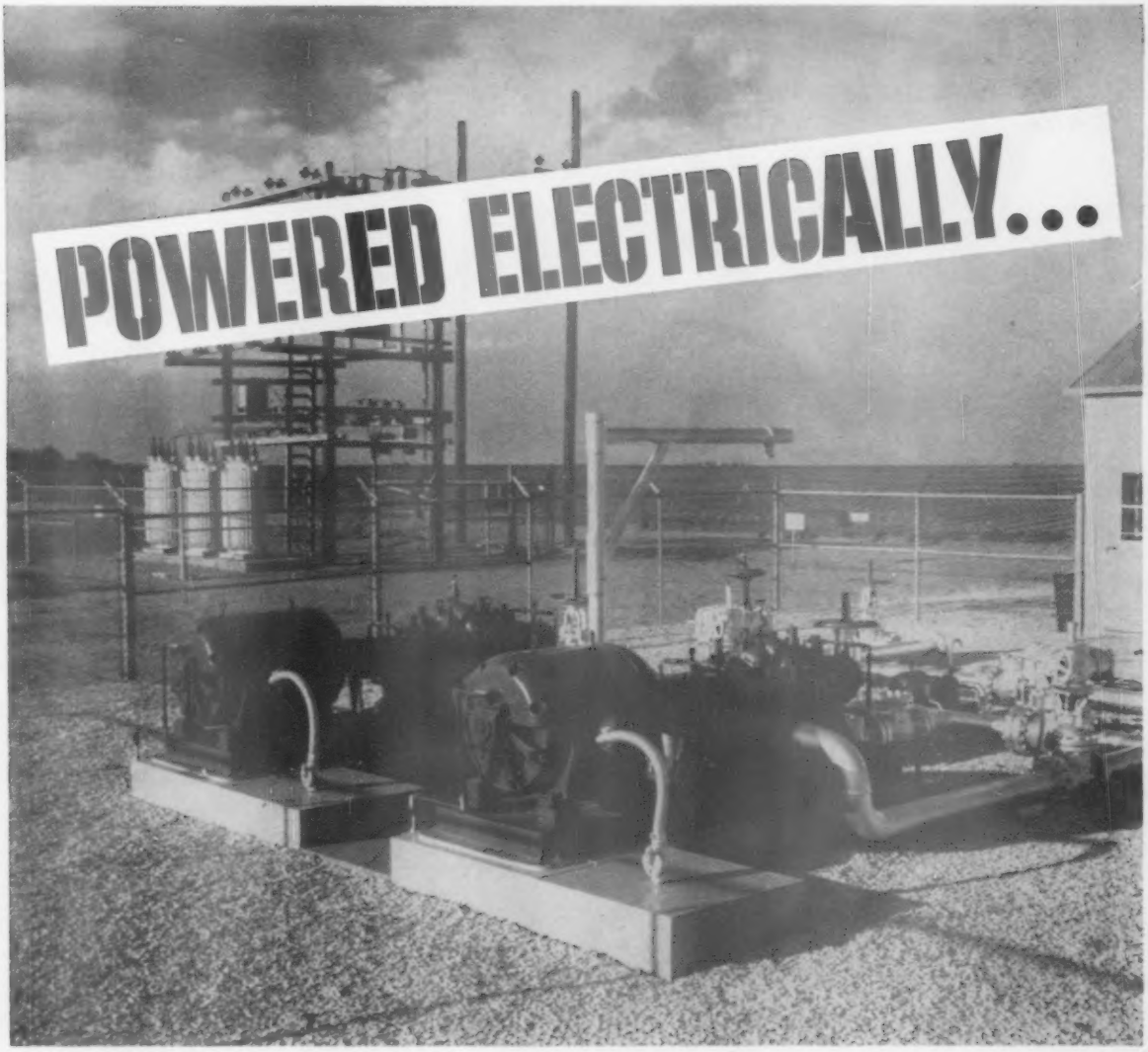
R. J. PETERSON

Victor M. Anderson has been promoted to assistant to vice president, sales; and Fred A. Brown and Robert J. Peterson have been promoted to assistant sales managers of Four Wheel Drive Auto Co. G. F. DeCoursin, vice president, sales, said the promotions to the newly created positions are part of the firm's expansion of its sales organization.

Anderson has been with FWD since 1936 and has been sales administrator for the last 4 years. Brown has been with FWD for 19 years. Much of the time he was district sales manager in the northwestern area. Peterson joined FWD in 1956. He will supervise FWD's western division sales staff.

Houdry Process Advances Norris in Sales Department

D. Eugene Norris was promoted to assistant process sales manager of Houdry Process Corp. He has served Houdry in their technical service division, the process section, the com-



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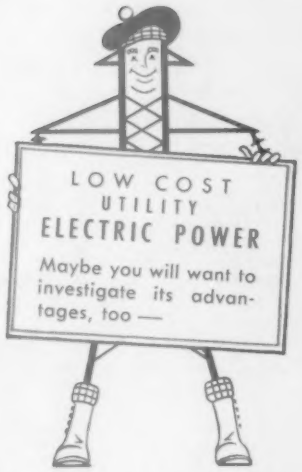

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All across the nation more and more plants are saving time and money by specifying Fabri-Valve. Preferred for their performance and economical operation, Fabri-Valves are custom-made to your specifications. Available in stainless steel, monel, nickel or any combination to meet your need. Fabri-Valves cost less...weigh less... and, of course, are cheaper to ship and install. For the best in modern valves specify custom-made Fabri-Valves.

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DIESEL ENGINEERING CO.	Seattle, Wash.
FELKER BROTHERS	Marshfield, Wis.
THOS. W. MACKAY & SONS, LTD.	Vancouver, B. C.
SOUTHERN CORP.	Charleston, S. C.

CASE HISTORY Nº AM-V-6122

One of a series dealing with the performance of Paxman engines, in oilfields in America, Africa, Europe and Australasia.

Aboard barge G.P.5 on LAKE MARACAIBO

OWNERS & OPERATORS: Compania Shell de Venezuela Ltd., Maracaibo, Venezuela.

INSTALLATION: Three OWECO E.500 slush pumps. Two normally in use, with third in reserve. Power for slush pumps by four Paxman 12 RPH "Package" sets of 1,468 total s.h.p. Two Paxman 12 RPH engines drive 250 kVA alternators to supply power and light.

PERFORMANCE: Barge G.P. 5 commenced full operation on June 3rd, 1955 and since then a number of wells have been completed. Reports received indicate that the Paxman engines have performed well and have given every satisfaction.

• Other areas where Paxman drilling engines are in service.

Any drilling superintendent will tell you good progress in the hole largely depends on availability of ample, dependable power for driving draw-works, rotary table and slush pumps. Paxman units are being chosen by an increasing number of oil companies and drilling contractors, for their rugged power and dependability.

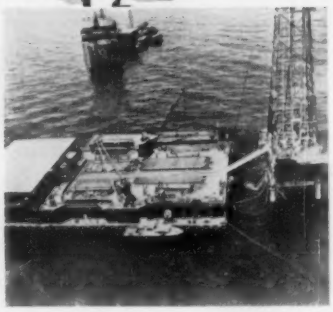
Look what you get when you specify Paxman:—

1 **WELL-TRIED DESIGN**
Paxman Vee-form engines have been continuously developed since 1937 to their present state of efficiency and reliability.

2 **RANGE OF POWER**
Paxman oilfield engines come in all sizes from 100 to 900 s.h.p.—the largest range with only one cylinder bore size.

3 **INTERCHANGEABILITY**
70% of the wearing parts are interchangeable. Think what this means to store personnel—only one basic set of components for all Paxman engines being operated.

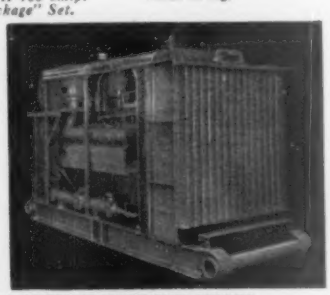
4 **ADAPTABILITY**
Close contact with the rig manufacturers, results in the Paxman "Package" unit being adaptable for use with any American or British make of rig.



12 RPH 400 s.h.p. "Package" Set.

5 **CHOICE OF FUEL**
Paxman engines are available to run on most grades of diesel fuel, or natural or other forms of gas; the gas engines are readily convertible to diesel fuel.

6 **SERVICE & SPARES**
The world-wide network of Paxman Agents and travelling engineers provide expert assistance. Paxman-guaranteed spares, reach you in perfect condition within a few hours of receipt of order.



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mercial development department, and the process sales department. He holds several patents in the refining field.

Great Bend Fishing Promotes Crothers and McCracken

Rene Crothers has been named manager in Sterling, Colo., and Wendell McCracken has been appointed mana-

R. CROTHERS

W. McCRACKEN

ger in Casper, Wyo., for Great Bend Fishing Tool Co.

Crothers joined the company in 1952 as fishing-tool operator in Great Bend, Kans. McCracken was a fishing-tool operator for Acme Tool Co. in Oklahoma City. Great Bend Fishing is an affiliate of Acme.

Polyken's Stineback Shifts to Kendall Co.

George C. Stineback, general sales manager of Polyken Industrial Tapes, was advanced to director of sales of the Chicago division of Kendall Co. Before taking over the sales operation of Polyken, Stineback was sales manager of Kendall Co. (Canada), Ltd.

Bristol Names Kearns As District Manager

J. E. KEARNS

John E. Kearns has been appointed manager of a new district sales office at San Francisco. H. E. Beane, vice president, sales, of Bristol Co., Waterbury, Conn., made the announcement. Kearns has been with Bristol since 1936. For the past 4 years he has been in the application engineering department where he specilized in automatic control.

Hills-McCanna Names McCloud and Rogers

Philip T. Rogers has been appointed as product sales manager of the valve sales department and P. R. McCloud has been appointed product sales manager of the pump sales department of

INSURANCE

Against washouts

If mud gets to your joint threads, it can wash out a string in a hurry. 'Bestolife Lead Seal Tool Joint and Casing Compound gives maximum, *tight* joint make-up, keeps mud out. Standard of the oil country for over twenty-five years. Unconditionally guaranteed. Packed in 1¼, 5, 20 and 50 lb. containers. Sold by leading supply houses throughout the world.

I. H. GRANCELL

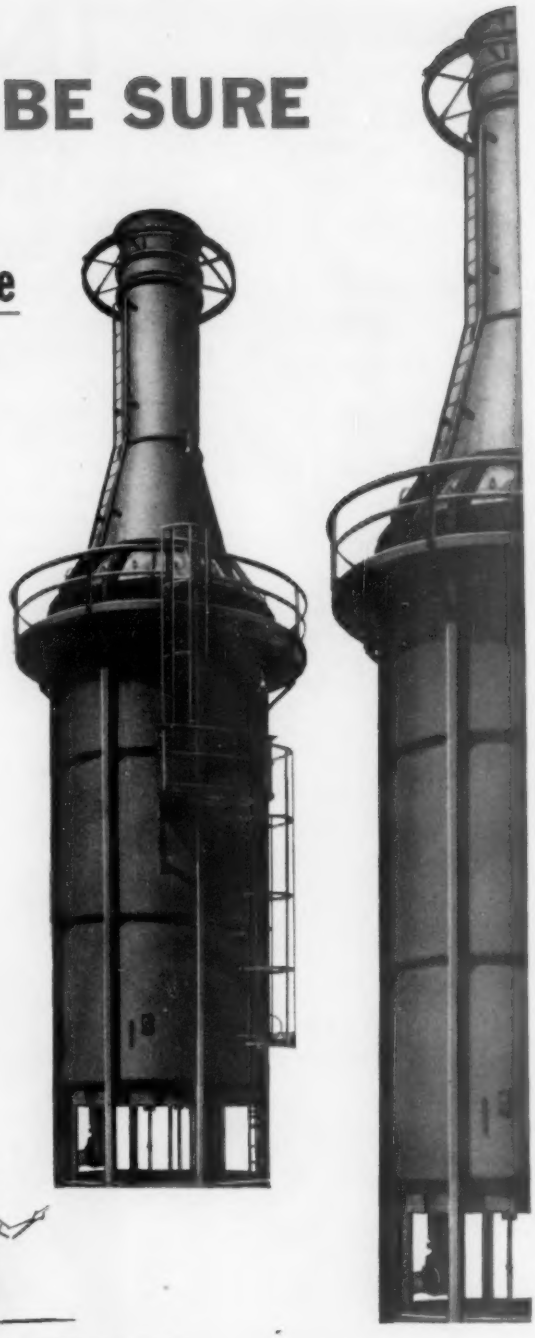
1601 E. NADEAU STREET, LOS ANGELES 1, CALIF.

YOU, too, CAN BE SURE

petrochem-isoflow furnaces

are most economically desirable

by any comparison



Whenever *all* the specifications and *all* the operating requirements are applied to direct-fired furnace design, you can be sure PETROCHEM-ISOFLOW FURNACES will be found most economically desirable, by any comparison.

In making comparisons it is essential to take these factors into consideration:

1—Average radiant transfer rate.
2—Maximum deviation from average radiant transfer rate.
3—Average and maximum transfer rate in convection section.
4—Maximum tube wall temperature, radiant or convection.
5—Maximum efficiency with specified excess air.
6—Controlled thermal recirculation of flue gases to provide even heat distribution throughout full length of each tube and equalized heat distribution around each tube.
7—Overload and corresponding transfer load.
8—Design to provide: structural column supports—Ladders—Platforms—Tube Removal facilities, etc.
9—Degree of assembly; of the furnace structure and of the heating surface.

When you specify PETROCHEM-ISOFLOW FURNACES . . . you'll be in good company. More than 1500 are now in service, performing to the complete satisfaction of their operators and usually well beyond their rated capacities.

PETROCHEM-ISOFLOW FURNACES

UNLIMITED IN SIZE . . . CAPACITY . . . DUTY

PETRO-CHEM DEVELOPMENT CO., INC. • 122 EAST 42nd St., New York 17, N. Y.

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Rawson & Co., *Houston* • Wm. H. Mason Co., *Tulsa* • Lester Oberholtz, *Los Angeles* • Faville-Levally, *Chicago* • D. D. Foster, *Pittsburgh* • Turbex, *Philadelphia* • Flagg, Brackett & Durgin, *Boston* • G. M. Wallace & Co., *Denver & Salt Lake City*

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the Hills - McCanna Co., in Chicago.

McCloud has been with Hills-McCanna since 1955 and was previously with Fansteel Metallurgical Corp. as Milwaukee district manager. Rogers came to Hills-McCanna in August 1956 and was with Socony Mobil Oil Co.

Fisher Governor Names Petty & Co. for Sales

Clarence B. Petty & Co., Needham Heights, Mass., has been made sales representative for Fisher Governor Co. in the New England area. Walter Taylor and Steve Lord, sales engineers, will assist Petty.

Cooper-Bessemer Elevates Cooper to Export Head

C. G. COOPER

The appointment of Charles G. Cooper to the export division of the Cooper - Bessemer Corp. has been announced by Lawrence F. Williams, president. In his new capacity, Cooper will serve as vice president and director of the parent company and as vice president of the subsidiary companies. These include Cooper-Bessemer International, Cooper-Bessemer Overseas Corp., and Cooper-Bessemer of Canada, Ltd.

Wilson Mfg. Names Ritchey

Kenny Ritchey has become representative for the Rocky Mountain area for Wilson Mfg. Co., Wichita Falls, Tex. Ritchey will headquarter in Denver, Colo.

Raybestos-Manhattan Changes Sales Set up

A reorganization of the field sales structure of the Manhattan Rubber & Packing Division has been announced by Raybestos-Manhattan, Inc., Passaic, N. J. The country is divided into four sales regions, each headed by a regional manager. The regional managers are supported by district managers who are responsible for supervision of field salemen's activities.

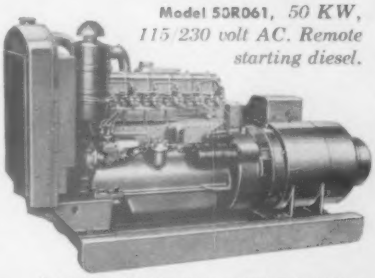
Here are the new regional managers and their respective district managers. R. F. Teeling, eastern regional manager, with Stewart Monroe as New York district manager; J. T. M. Frey, New Jersey district manager; and F. McBrearity, Philadelphia district manager.

A. L. Hawk, central manager, with A. N. Johnston, Jr., as Pittsburgh,

Kohler Electric Plants for sole supply and stand-by use

Diesel power for offshore drilling

Reliable power for stationary, portable or offshore rigs. Diesel models 10 and 20 KW for lighting, galley equipment on quarter boats, personnel boats, tugs, barges, offshore exploration; 10 to 50 KW for rig lights, floodlights, power tools . . . Air-cooled portable plants, 500 to 5000 watts for seismograph equipment, well logging service trucks . . . Gasoline or gas operated liquid cooled models, 500 watts to 50 KW for all oil field operations . . . Automatic stand-by plants for tank farms and refineries. Write for folder 20-A.



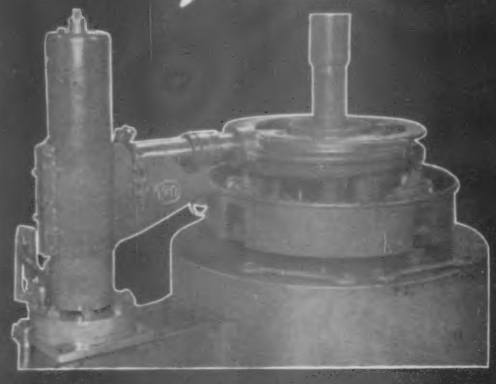
Model 50R061, 50 KW, 115 230 volt AC. Remote starting diesel.

Kohler Co., Kohler, Wis. • Established 1873

KOHLER OF KOHLER

PLUMBING FIXTURES • HEATING EQUIPMENT • ELECTRIC PLANTS
AIR-COOLED ENGINES • PRECISION CONTROLS

THESE ARE THE Facts ABOUT KELCO AIR OPERATED POWER SLIPS



Compare!

- Only 5" lift — several times lower than on any other slips. Eliminates elevator follow down while setting.
- Exceptionally long life dies.
- Four slips, individually hung, move straight into pipe without radial drag as found with clustered slips.
- From 2" tubing through 7" casing.
- Solid slip bowl protects drill pipe and casing as efficiently as casing spider and serves to guide pipe through slips.
- Patented safety latch absolutely prevents slip setting due to air failure — operates continuously.
- More crew safety.
- Automatic safety warning whistle to protect personnel and pipe.

Representatives in All Fields . . . Be Safety Wise — KelCo-ize

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SPINNING LINE CATHEADS • BREAKOUT CATHEADS • AIR OPERATED POWER SLIPS
TUBING TONGS • SAFETY "C" POLISHED ROD CLAMPS
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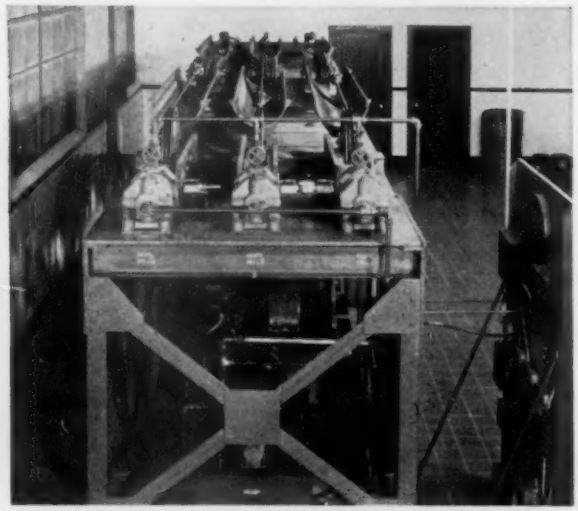
Tuffy Wire Rope Tips



Until recently, a relatively meager amount of factual data has been available for estimating life expectancy of wire rope. Predicting how much service life could be expected from a given wire rope construction under a given set of operating conditions was largely a matter of guess-work, trial-and-error and generally inexact calculations.

Since bending stresses are a major factor in wire rope life, Union Wire Rope engineers designed the Accelerated Fatigue Tester, shown above, with which to pin down the effects of bending on wire rope. Now, from a long and exhaustive series of bending tests, scientific data has been accumulated and organized to take the place of former rule-of-thumb methods.

The data established by this laboratory research is based on the effect of various sheave diameters on bending stresses of various constructions of wire rope.

From test data, bending-life curves have been plotted by Union Wire Rope engineers for each of the more widely used rope constructions. Analysis made on each of these curves showed them to follow a pattern expressed by the curve shown in Fig. 1.

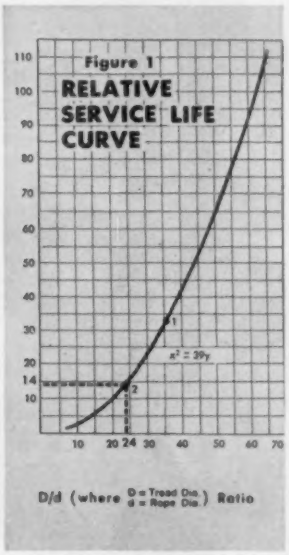


Table 2

BENDING-LIFE FACTORS

When Using Curve of 6x35 FW

CONSTRUCTION	FACTOR
6x7	0.57
18x7	0.67
6x19 Seale	0.73
6x19 Seale	0.80
6x21 Filler Wire	0.92
6x25 Filler Wire	1.00
6x31	1.00
8x19 Seale	1.14
6x37	1.33
8x19 Warrington	1.33
Tiller Rope	2.00

Table 3

SHEAVE DIAMETER FACTORS

ROPE CONSTRUCTION	GENERAL PURPOSE RANGE D/d Ratios (where D = Tread Dia. d = Rope Dia.)	
6x7	63	42
18x7	54	36
6x17 Seale	49	33
6x19 Seale	45	30
6x21 Filler Wire	39	26
6x25 Filler Wire	36	24
6x31	33	22
8x19 Seale	31	21
6x37	27	18
8x19 Warrington	27	18
Tiller Rope	18	12

Note on Fig. 1 the curve shows that as the ratio of tread diameter to rope diameter increases (see D/d figures at bottom of chart) the longer the relative service life as expressed by the figures at the left of the chart.

However, there are few pieces of equipment on which sheave and drum sizes can be large enough to afford D/d ratios above 50. From test data the general-purpose range of D/d ratios was determined. Those recommended are set up in Table 3.

Spotted on the curve, for example, is the D/d ratio of 24 at point 1 and D/d ratio of 36 at point 2—these being the range for general purposes taken from Table 3 for the 6x25 filler

Tuffy Special Wire Ropes are tailored to special use. Ordering is easy:

Tuffy

Rotary Lines

← Standard . . .
For drilling use in any formation with standard rigs. Also gives long-running service for deep drilling beyond 6000 ft. with jackknife rigs. Has a widespread reputation for easy spooling and more ton-miles before cutting is necessary.

Or Jackknife →
Star performer on jackknife rigs drilling to 6000 feet. Extra strength with extra flexibility. Spools smoothly on small sheaves and drums.

Ton-Mile Indicator and Log Book: Gives you a fast, easy slide-chart method of figuring ton-miles, along with a log book in which to record your ton-mile record.

Cut-Off Practice Book: Outlines quick, easy dependable method of determining when to cut-off and how much. Shows how to get greatest service from rotary lines; how to avoid cutting too much too soon, or too little too late. Carries cut-off tables for derricks of all heights with various draw-works.

Handbook of Wire Rope for Well Drilling and Servicing. 40-plus pages of useful facts and information on wire rope for rotary, cable tool drilling and well servicing. Full data on sizes and constructions of wire rope for every oil field service. Covers care of wire rope, lubrication, correct handling, seizing and socketing, and many other topics.

FREE These books are yours for the asking. Write today!

How to predetermine wire rope life

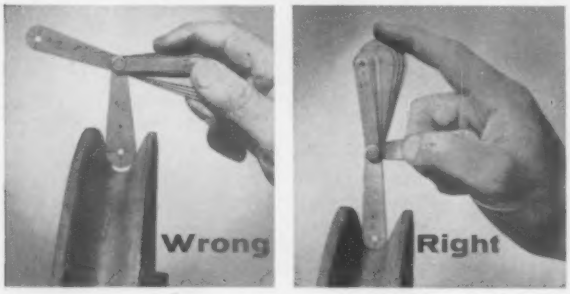
Here's the easier, surer way developed by Union Wire Rope Corporation Engineers

rope. Moving from these points to the left on the chart, the relative service life of this rope ranges from 14 to 34 units of any service measure used, such as yards, tons, days, etc.

Now to determine the relative service life of say a 6x37. Its bending life factor (see Table 2) is 1.33 as compared to 1.00 for the 6x25 filler wire. Multiply the service life readings of 14 and 25 for the 6x25 filler wire by 1.33, and we find the service life range of the 6x37 falls at 18 and 27 units of service. Relative service life of other ropes are determined in the same way by using the bending factor indicated for each as the multiplier.

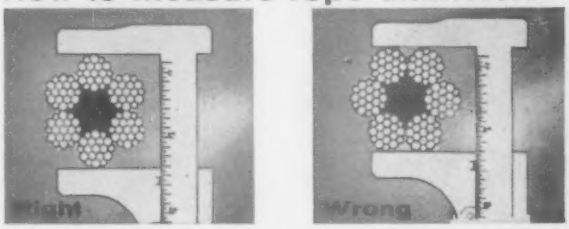
Of course bending is not the only wear factor in wire rope operation, and the general rule—that more flexible ropes should be used as bending stress increases with decrease in diameter of sheave or drum—has to be modified in field use. In fact there are eight other principal operating conditions, in addition to bending stresses, that affect wire rope service life. They are loading conditions, portability, corrosion, abrasion, rope speeds, materials handled, and equipment design.

What Size Rope?



Check groove diameter: When new wire rope is to be used on old equipment, make sure the tread or bearing surface of all sheaves is of sufficient groove diameter to avoid pinching the rope.

How to measure rope diameter:



Use a machinist's caliper. Be sure to measure the widest diameter.

How to measure tread diameter:

Select the smallest sheave or drum to be used with the new wire rope, and measure actual diameter of tread.

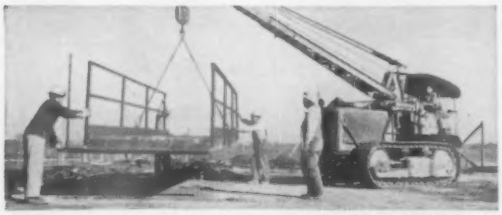
Sheaves with grooves corrugated with rope lay impression should be replaced with new ones before installing new wire rope.

New wire ropes are usually over-size. It is advisable to have groove diameters of sheaves or drums as large as the actual calipered diameter of the new rope, or slightly larger. We recommend sizes as follows:

Diameter of Rope	Groove Diameters	
	Minimum	Maximum
½" and smaller	diameter + 1/32"	diameter + 3/32"
9/16-1"	diameter + 1/16"	diameter + 1/8"
1-1/16-2"	diameter + 3/32"	diameter + 3/16"
Over 2"	diameter + 1/8"	diameter + 1/4"

Following the above instructions, you will know the Diameter of Wire Rope to use to fit your equipment.

Just say **Tuffy** give length and size, and forget complicated specifications.



Tuffy Slings and Hoist Lines

Want to cut hoisting and downtime costs? Put this pair to work. **Tuffy Slings** are made of a patented, machine-braided fabric that stays extra flexible, and isn't materially damaged by knotting or kinking. **Tuffy Hoist Line** is a longer-running, uniformly dependable rope on overhead stiff leg and mobile cranes, clamshells and derricks.

Your Tuffy Distributor is ready to help you with any wire rope problem.

If you aren't acquainted with him, look under "Wire Rope" or "Slings" in the classified pages of your telephone directory.

FREE! New "Rope Dope" Educational Bulletins

They're packed with boiled-down, useful information on the selection and care of wire rope for greatest service. Just ask your Tuffy Distributor to put your name on his mailing list.

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Specialists in high carbon wire, wire rope, braided wire fabric, stress relieved wire and strand

Baash-Ross **KELLYS**
are first choice because...

Unusually accurate bore due to "Know How" and advanced machining techniques.

Joints are "Hob Cut" to eliminate human error.

Precise machining not only meets but exceeds API specifications.

Each heat of steel checked for quality by separate test specimens.

High physicals insure inherent strength.

BAASH-ROSS makes Kellys in all sizes—all designs (square, hexagon and octagon) and all lengths... plus incorporating the most advanced construction and metallurgical features. No effort is spared to insure you that a B-R Kelly is the very best that money can buy.

BAASH*ROSS
TOOL COMPANY
DIVISION OF JOY MANUFACTURING COMPANY

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For further information write P.O. Box 1348, Houston 1, Texas or see The Composite Catalog.

district manager; G. S. Himebaugh, Chicago district manager; and E. T. Fair, Denver district manager. C. P. Shook, Jr., southern regional manager, with A. A. Ringland as Birmingham district manager; A. E. Jackson, New Orleans district manager; E. W. Nagel, Dallas district manager; and R. C. Nielson, Houston district manager.

S. V. V. Hoffman, western regional manager, with R. B. Park as San Francisco district manager.

Tandrup Becomes Technical Representative for Ethyl

E. L. Tandrup has been appointed as technical representative of the Detroit research laboratories of Ethyl Corp. He will act in a liaison capacity between the Ethyl research laboratories and Ethyl customers in West Virginia and the western section of New York and Pennsylvania. He will make his headquarters in the Detroit laboratories.

Ethyl's technical representatives work with refiners throughout the country. Other members of this group include Richard B. Sneed, Michael A. Remondino, Gilbert Way, Edwin A. Desmond, Jr., and Benjamin Brewster.

Fischer & Porter Opens Indianapolis Office

William Morgan will be the district manager of a new sales office in Indianapolis, Ind., for Fischer & Porter Co. The new office will cover Indiana except counties in the northwest, which will be serviced from Chicago, and counties along the southern border, which will be serviced from Cincinnati, Ohio.

Morgan formerly headed F&P's Milwaukee office.

U. S. Industries Builds New Research Center

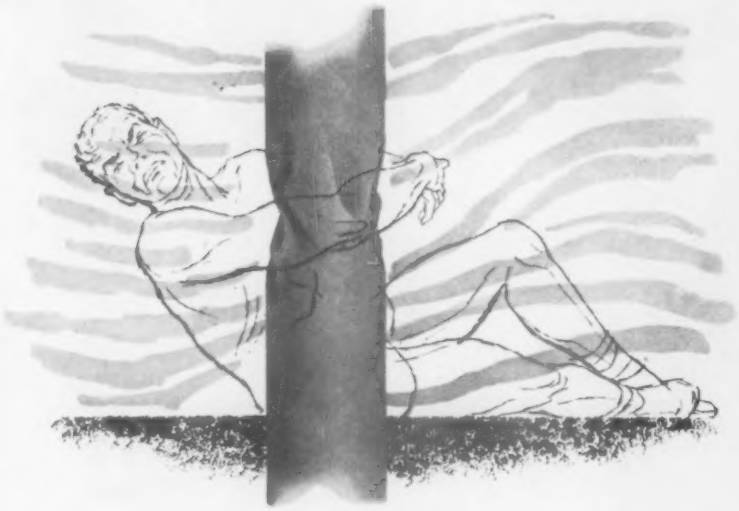
John I. Snyder, Jr., chairman of the board and president of U. S. Industries, Inc., announced plans for a large research and development center at Pompano Beach, Fla. USI's 12 divisions are active in heavy-metal fabricating (machine tools), petroleum equipment, and the water industry. It designs and manufactures electronic systems and components through Western Design & Manufacturing Co., Santa Barbara, Calif.

Magnaflux Elects Schiebel

Roy O. Schiebel has been elected to the new position of second vice president, sales and marketing of the Magnaflux Corp. F. B. Doane, chairman

Some water-floods are

STRANGLING themselves!



That's not poetic license, but sober, frightening fact! For the water itself, in many floods, is the very thing that is slowly choking the flood to death. Algae and bacteria (particularly the sulfate-reducing bacteria), not removed by treatment and ordinary filtration, travel into the flood zone with the flood water; there, in the heat and darkness, they thrive and multiply, reducing the permeability almost as effectively as cement. Down goes the drive, up go pump pressures!

THE BRIGHTER SIDE!

But there's a happier story on floods where filtration with Dicalite filteraids is employed. So "sharp" is this filtration that algae and practically all bacteria are effectively removed before the flood water is pumped into the formation. Results? No formation blocking, as proved by the fact that pump pressures remain practically constant, month after month – sustained oil production because the water drive is operating at full efficiency.

LESS COST . . . LESS SPACE . . . PLUS PORTABILITY

Dicalite filtration of flood water requires less capital outlay and takes less space than do conventional sand filter systems. And, if desired, this more efficient system can be made completely portable, as is the case with several flood systems now operating, which are completely salvageable and movable from one location to another.

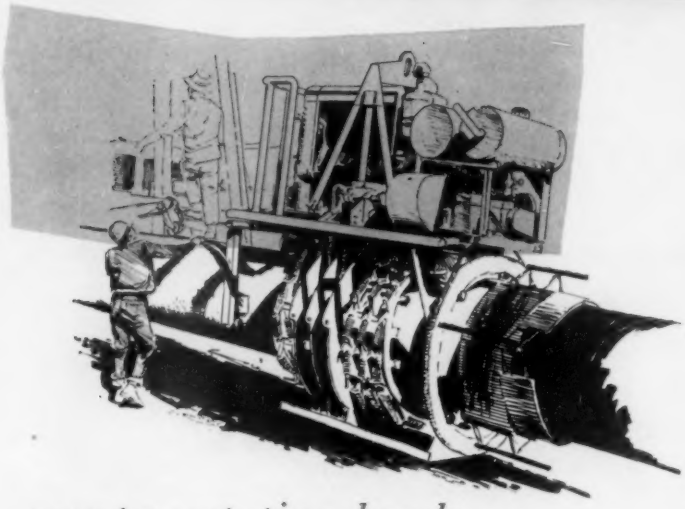
Write for complete information.

Dependable GLC GREAT LAKES Dicalite DIATOMACEOUS MATERIALS

DICALITE DIVISION • GREAT LAKES CARBON CORP., 612 SO. FLOWER ST., LOS ANGELES 17, CALIF.

CROSE . . . line traveling

cleaning and priming machines



counter-rotating heads assure faster cleaning and priming

Counter-rotating heads prevent pipe from turning and give a better cleaning job. Crose machines are ruggedly built yet light weight—specifically designed for faster, trouble-free service on the line. Crose line traveling machines can also be used with a stationary base for yard work. Crose makes machines for cleaning and priming pipe up to 36".

M. J. Crose Manufacturing Company, Inc.

2715 DAWSON ROAD • TULSA, OKLAHOMA • PHONE RAdison 6-2172

and president, made the announcement.

Schiebel was made Los Angeles branch manager in 1942. After the war he went to Chicago as Midwest district manager. In 1952 he moved to New York as eastern district and export manager. He returned to Chicago as the sales manager in 1955.

Rodney Hunt Machine Co. Appoints Process Sales Co.

The Process Sales Co. of Beaumont, Tex., has been appointed to represent Rodney Hunt Machine Co., Orange, Mass., in the sale of Turba-Film processers and other process equipment. Hunt Machine will be represented by Process Sales in Texas and Louisiana.

L. P. (Bud) Skinner, Jr., formed the new Process Sales Co. Skinner has experience in the petrochemical and heavy-chemical industry. He has worked for Mathieson Chemical Co., Neches Butane Products Co., and Du-Pont.

Bucyrus-Erie Appoints Spahn as Service Engineer

The appointment of Clair A. Spahn as service engineer for Bucyrus-Erie oil-well spudders in five east-central states and Ontario has been announced by the South Milwaukee, Wis., firm. He is attached to the Evansville, Ind., sales office. He will handle service work in Indiana, Illinois, Ohio, Michigan, and Pennsylvania in addition to Ontario customers.

Spahn has been active in the drilling business for 11 years starting with Alcoa Products, Inc., as a tool dresser. After 1½ years with Alcoa he went into business for himself and drilled in the Latrobe area for 7 years.

RCA Service Co. Names Eight Managers

Appointment of managers for eight service regions was announced by W. L. Jones, vice president, technical products service department, RCA Service Co., Inc. The managers will be responsible for field service and installation of equipment in industrial plants, and two-way radio communication systems.

The appointments and headquarters locations are: B. D. Bachin, eastern region, New York; M. E. Wheaton, Midwest region, Philadelphia; C. L. Swinney, southeast region, Atlanta,

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SLASH FIELD OFFICE COSTS WITH A MOBILE **SPARTAN "DIRECTOR"**

You don't have to build and abandon a field office or entire camp anymore—mobile Spartan Directors are meeting a wide variety of field housing needs. Whether you need a single unit . . . for office . . . expediting work in remote areas —or whether you are setting up an entire oil field camp—Spartan Directors are the most economical. They're built for rugged use . . . they're comfortable and convenient . . . and they're mobile. Spartan builds units for practically any field use—like mess halls, radio shacks, power generating plants, employee leisure rooms, and housing units with up to three bedrooms.

For further information, write, call or wire:

INDUSTRIAL SALES DIVISION

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Shell is all-aluminum, riveted construction . . . no wooden studs to warp, rot or swell . . . no nails to rust or pull out.

Foundation or frame is rugged, unitized steel construction . . . one-piece continuous roll-form steel longerons, and electric-welded cross members and gussets.

A Better
TRAVELING BLOCK
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Every Purpose
(50-500 Ton)
Write for
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Ga.; W. W. Gilreath, southwest region, Dallas; E. D. Van Duyne, west-central region, Kansas City; F. W. Hamre, central region, Chicago; H. M. Madison, western region, Hollywood, Calif.; H. E. Frisbie, east-central region, Cleveland, Ohio.

C B & I Opens New Sales Office at New Orleans

A new sales office has been opened by Chicago Bridge & Iron Co. in New Orleans, La. This office will handle sales in Louisiana and the southern part of Mississippi.

J. U. Blanchard is the manager of the new sales office in New Orleans for Chicago Bridge & Iron Co. The new office will handle sales in Louisiana and the southern part of Mississippi. Blanchard has been in the Houston sales office since 1946 and with the company since 1937. He will be assisted by B. S. Jenkins.

B & W Advances Mackenzie

MACKENZIE

S. T. Mackenzie has been elected a vice president of Babcock & Wilcox Co. and placed in charge of the sales department of the company's boiler division. L. S. Wilcoxson, vice president in charge of the boiler division, made the announcement. Mackenzie was formerly sales manager of the sales department and his appointment fills a vacancy created by the retirement of W. T. McCullough, Jr.

Crane Packing Co. Completes Expansion

The Crane Packing Co. has just completed a 3-year expansion and construction program. Crane produces mechanical seals and packings, Chemlon products made from Du Pont Teflon, precision lapping machines, and pipe-joint and thread compounds. The program started with the breaking of ground for the recently completed home offices, laboratory, and factory located on a 22-acre tract in Morton Grove, Ill.

A. O. Smith Appoints Stahl

J. J. Stahl has been appointed assistant regional manager for the eastern district of the A. O. Smith Corp. Stahl formerly was sales manager for electric motors in the company's Pa-

FLINT CAN SUPPLY YOUR STEEL

Flint's engineering, fabrication, storage and distribution facilities involve more than 340,000 square feet of working space in two conveniently located plants.

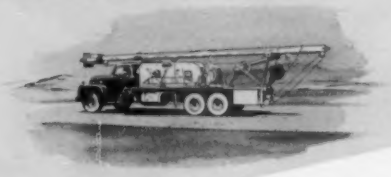
Service that's personalized and dependable—a modern and flexible operation that can be depended upon to deliver as specified.

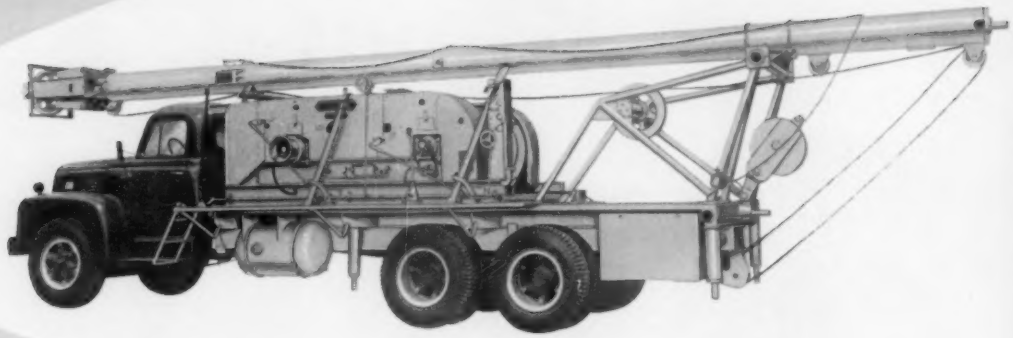
STEEL WAREHOUSE DISTRIBUTORS
FABRICATED STRUCTURAL STEEL
FABRICATED STEEL PLATE
FABRICATED REINFORCING STEEL
FABRICATED GALVANIZED STEEL

for over 40 years
FLINT STEEL CORPORATION
TULSA . . . MEMPHIS

SPEED

ON THE JOB... BETWEEN JOBS...





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Because it's designed for faster moving . . . faster rig-up and tear-down . . . faster on the job performance, use of a Cardwell MODEL K203 Double Drum Servicing Hoist results in hard-money savings! It combines rugged-duty construction with lightweight mobility . . . is depth rated to 9,000 feet for well servicing, swabbing, etc. . . . and is equipped with a Cardwell 140,000 pound capacity telescoping pipe mast as standard equipment . . . telescoping stinger available.

Located well forward to provide ample rear deck storage for tools, blocks and other equipment, the hoist features a fully enclosed oil-bath input drive. Remote control is provided for 5 forward and 1 reverse speed, gear transmission and Cardwell Flex-Disc air friction clutches are used throughout.

Easy to handle—on the road or in the field—Cardwell's K203 *speeds* the job—to save time and dollars!

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A-1-57

cific Coast district. He also had been integral horsepower motor sales manager.

Rockwell Promotes Cochran To Expanded Denver Office

Orville Cochran, Denver branch manager, has been promoted to district sales manager at Denver for Rockwell Manufacturing Co.'s meter and valve division. The branch office has been expanded into a district office. R. R. Bush, midwestern regional sales manager, made the announcement. Bush said the expansion was made to keep pace with the rapid industrialization of the Rocky Mountain area.

Cochran served as a sales engineer for Rockwell in the Rocky Mountain territory for more than 25 years before he was named branch office manager in 1955, when the Denver office was opened.

Caran Engineering Adds Gray as Chief Engineer

Frank B. Gray, Jr., has joined the Caran Engineering Corp. of San Antonio, Tex., as chief engineer in charge of the Spectr-Graph (spectrometric well logging) division. Gray served as head of the applied-physics group for Leeds & Northrup Co. in the development of spectrometric instrumentation for industrial applications for the petrochemical and chemical industries. He will develop new spectrometric techniques for identifying and measuring hydrocarbon gases from oil-well drilling muds.

Chem Lab Opens New Office and Two New Labs

Chemical and Geological Laboratories, Casper, Wyo., has completed its current expansion program which was planned to provide better service in the Colorado and New Mexico areas. James E. Campbell, secretary-treasurer and sales manager, has moved to Denver to take charge of the company's newly established Denver office.

Chem Lab has taken over the laboratory of Basin Core, Inc., at Sterling, Colo. The same presonnel will continue at the laboratory. This includes: Gordon Coe, manager; Ed Harr; and Mrs. Vena Lee Baird.

Although the company's laboratory in the Four-Corners area has just been opened, Chem Lab has done a great deal of work in this section. J. G. Crawford, president, has done much of the analytical work in this area since 1930. A. G. (Pat) Jamison, manager of the Farmington laboratory, has

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EXCLUSIVE "SLING JOINT" PREVENTS BAND FROM DIGGING INTO PIPE COATING
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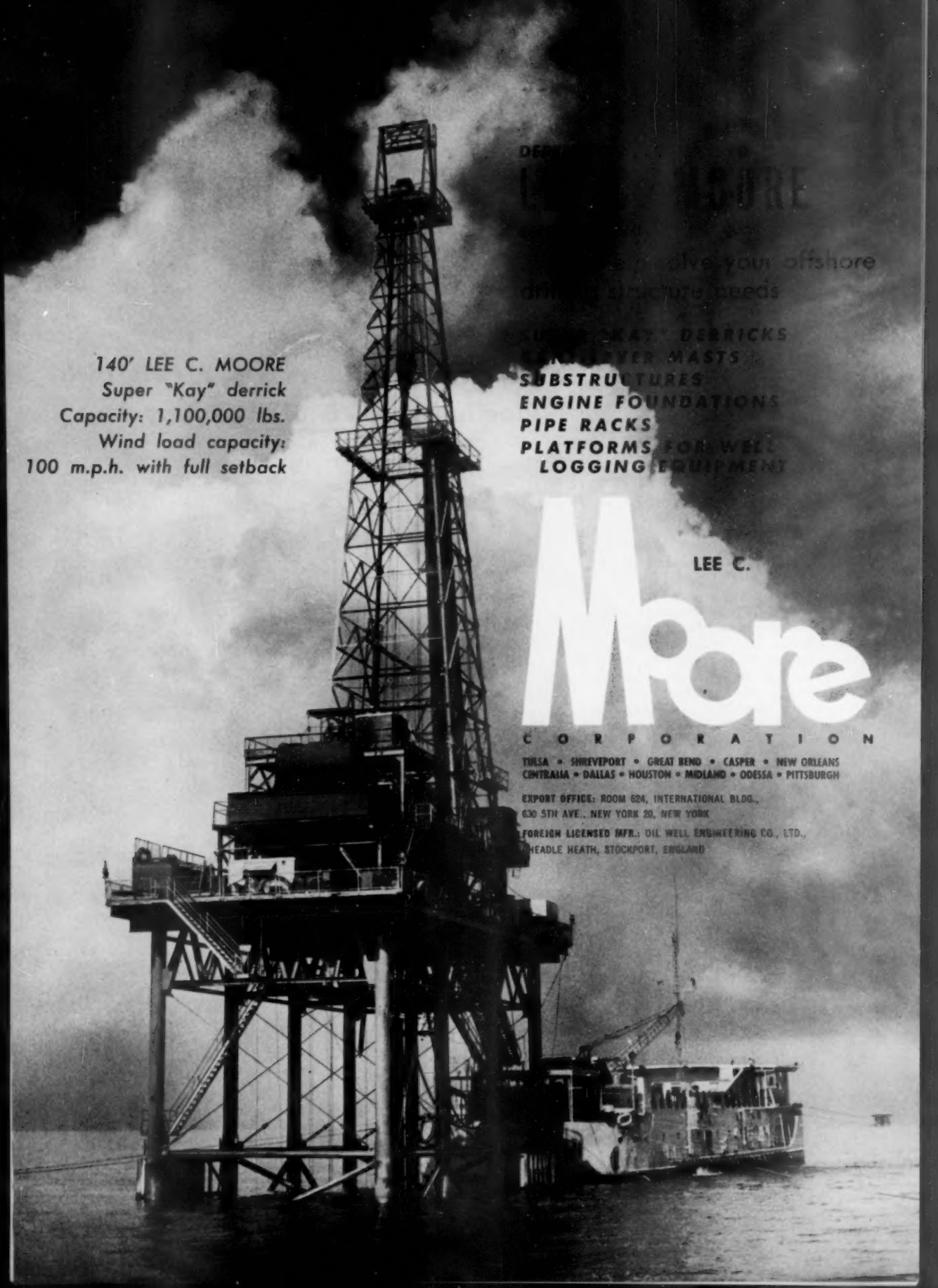
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been associated with the San Juan basin activities for the past 6 years. Other personnel include Roger Artley, who has been with Chem Lab since 1952, and George Luckett.

Security Engineering Appoints Talbert

Appointment of M. L. Talbert as chief engineer for Security Engineering Division has been announced by C. L. Lane, president. In his new capacity Talbert will coordinate field and plant engineering functions in the development and manufacture of rock bits and allied drilling equipment. Talbert was formerly assistant chief engineer and replaces Carl Lichte. Lichte joined the Turbo-Drill Division of Dresser Industries.

Jefferson Chemical Raises District Sales Managers

George H. Kahl, Kenneth L. VanderVoort, and John G. Sibley have been appointed district sales managers for Jefferson Chemical Co., Inc., according to Donald L. Griswold, general manager of the marketing department. Kahl takes over the New York district, VanderVoort is promoted to the Chicago district, and Sibley becomes the Charlotte, Va., district sales manager.

Magcobar Receives First Shipment of Greek Barite

The first shipment of barite from the new Greek mining and ship-loading facilities of Magnet Cove Barium Corp. has arrived at Magcobar's New Orleans plant. The arrival was announced by Willard M. Johnson, president. This initial 10,000 tons of barite will be processed for use as heavy weight material for drilling mud. Regular shipments of barite from the Mykonos mine will follow.

Leschen Appoints Haffermehl

George T. Haffermehl has been appointed as sales representative for Leschen Wire Rope Division, H. K. Porter Co., Inc. His territory will cover the New England states and eastern New York State. Haffermehl was with Masury-Young Co.

NCG Expands Operations

A program for construction of industrial gas-production facilities or expansion of present facilities at six locations in Alabama, California, Illinois, Puerto Rico, and Venezuela was

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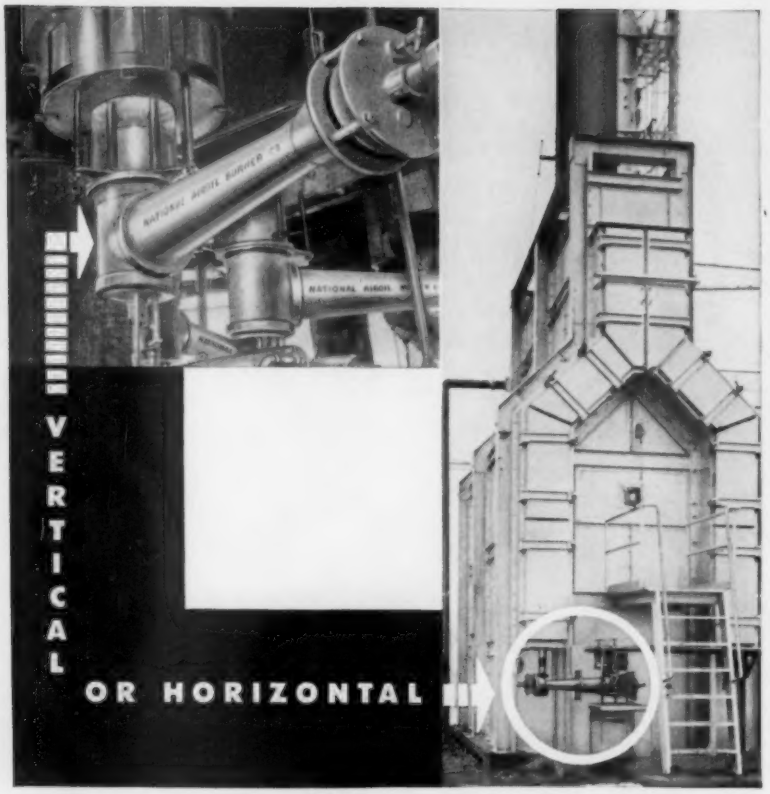

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"Many, many more hours on stream, without shutdown" . . . yes, YOU will realize higher profits from YOUR heaters when NATIONAL AIROIL VERTICAL or HORIZONTAL Tandem Units are specified. Our new Bulletin 498 is yours for the asking.

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INDUSTRIAL OIL BURNERS, GAS BURNERS, FURNACE EQUIPMENT

announced today by the National Cylinder Gas Co. Charles J. Haines, president, said the expansion was due to the industry's increased need for supplies of industrial gases, notably oxygen and hydrogen. The program will bring to 78 the number of plants at which NCG produces one or more kinds of industrial gas. This includes one in Canada, one in Puerto Rico, three in Colombia, and five in Venezuela.

Griscom-Russell Plant Facilities Are Under way

Construction has begun in Massillon, Ohio, on a new plant building for The Griscom-Russell Co. The 100 by 120-ft. building will adjoin the present main plant.

The plant is being built by the Massillon Industrial Foundation and will be leased by Griscom-Russell. The foundation is a local group of 118 members that was formed to further industrial development in Massillon.

Exploration Techniques Occupies New Offices

Exploration Techniques, Inc. has moved into new offices in the South Coast Life Insurance Building, Bellaire, Tex.

The company, organized in June 1956 by J. W. (Bud) Phillips and Len W. Brasher, uses an analog computer in determining geophysical data.

Two Subsidiaries Become Divisions

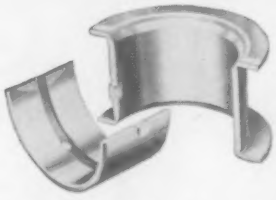
J. E. Jonnson, president of Texas Instruments, Inc., Houston, announced that two wholly owned subsidiaries became operating divisions of the company. Technical Laboratories has become the industrial instrumentation division. Wm. I. Mann Co. has become the optics division.

Duff-Norton Raises Krueger

T. W. Krueger has been promoted to sales manager of the jack division of Duff-Norton Co. He will be in charge of industrial and export jack sales. Krueger was with Jones & Laughlin Steel Corp before joining Duff-Norton in 1947.

3M Appoints Sanford

Ward B. Sanford is now eastern sales representative, reinforced-plastics division, of the Minnesota Mining & Manufacturing Co. Sanford joined 3M as a mechanical engineer in 1949. In his new position he will headquarter at 3M's Ridgefield, N. J., branch office.



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Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

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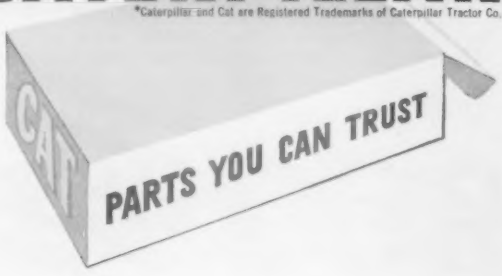

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Let's Look at the New Spraberry Trend

by Norman S. Morrisey
Drilling-Development Editor

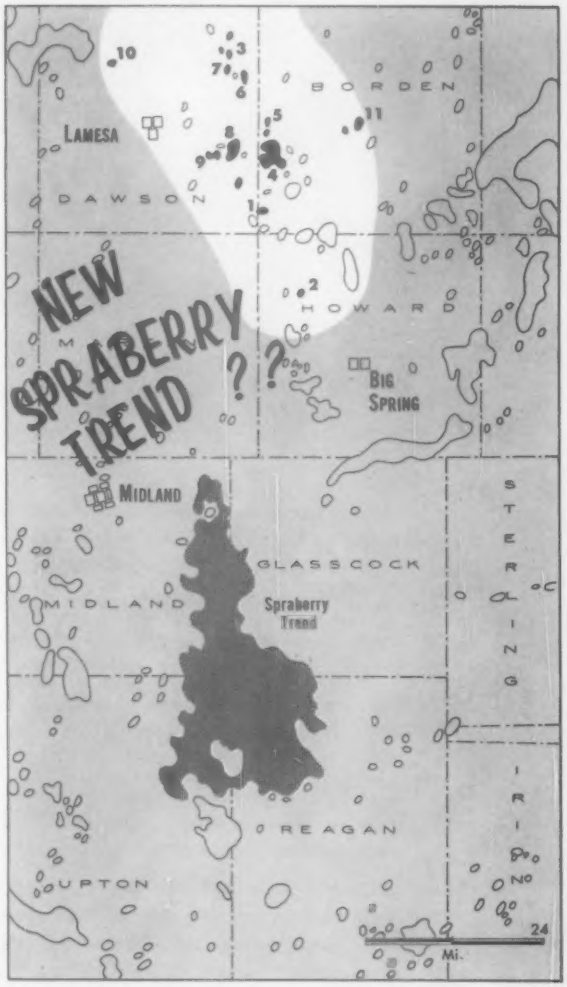
NEW oil fields are elusive. They're hard to find. New oil fields don't walk up to the oil finder and say "Here I am, waiting for you to recommend the discovery well." And strat traps normally fall in the especially-hard-to-find category.

But this concept is losing adherents. Apparently strat traps are hard to find only because oil finders haven't been looking hard for them.

The four-corner area where Howard, Dawson, Borden, and Martin counties join is a good example of what can happen when you change your sights in exploration and look for strat traps. Most of the fields in the area were discovered at a time when reefs dominated exploration thinking. The entire exploration program was geared to finding reefs. And the oil finders found lots of reefs.

Spraberry oil possibilities were largely ignored, although a few Spraberry fields were uncovered. The word Spraberry suffered from the stigma attached to the tight fractured siltstone of the Spraberry trend, 36 miles to the south. Slowly during the past 12 months in Borden, Howard, Martin, and Dawson counties, the thinking about the uneconomic Spraberry has changed. Operators have gone back in and reworked old dry holes. They are reevaluating the known structures.

The pay zone? Not the highly prized reef of 5 years ago, but sands in the Spraberry section passed up during the earlier drilling campaign.



WITH 11 SEPARATE POOLS producing from sands in the Spraberry, a new trend may be shaping up. Present activity is only 36 miles north of the old Spraberry trend.

Regional trend shaping up . . . Already there are 11 separate new areas where the Spraberry produces. The trend runs roughly northwest-southeast, a distance of 40 miles from Southeast Welch (No. 10 on the map) in Dawson County to Bond field in northwestern Howard County (No. 2 on map). The production from the 11 producing areas was set at 33,310 bbl. per day on the latest allowable schedule issued by the Railroad Commission of Texas. Actual production from the fields probably averages about 15,000 bbl. daily.

Most of the development to date has been in the old fields; in some instances the acreage was already held by production. Several dry holes have been successfully reworked and completed as Spraberry producers.

Although some of the Spraberry production is related to structure, there is enough control to show that other areas are definitely strat traps. And Apclark field, the isolated patch of Spraberry production near Gail in central Borden County (11 on map) has extended the play 15 miles to the northeast. The discovery well at Apclark, Anderson-Prichard Oil Corp. 1 Clark, was completed for an initial potential of 135 bbl. per day plus 27 per cent salt water.

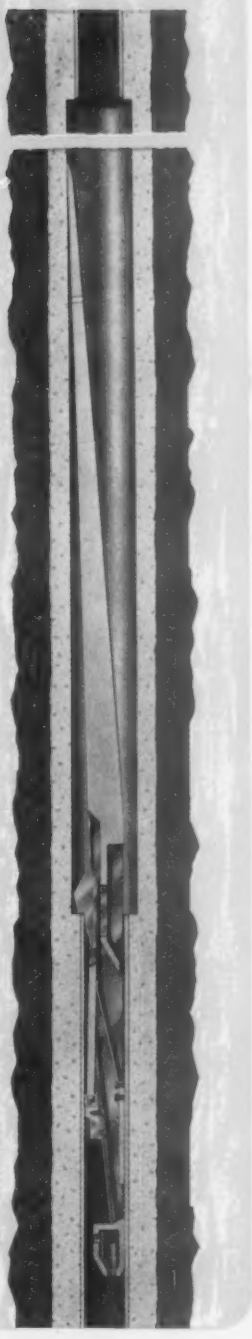
New Spraberry . . . Actually the "new Spraberry" is vastly different from the producing zone on the old Spraberry trend. In the four-corner area production is related to both structure and stratigraphy. At West Spraberry, the trap is related to structure where the Spraberry is draped over the reef. The Jo-Mill production is from a stratigraphic trap.

The Spraberry occurs above the main reef producing zones and is Wolfcamp in age. Apparently several zones produce in both the upper and lower Spraberry. These zones were largely ignored during the drilling of the reef fields. Now with better completion techniques, these sands are economic and have become primary objective in the current drilling campaign. At the present time there are 24 active locations in the four-county area seeking new reserves in the Spraberry.

How big will the play be? Subsequent drilling will provide the answer. But geologists know from experience that strat traps can develop into giant oil fields and giant oil fields are not common in exploration circles today. Let's hope the new Spraberry lives up to expectations and surpasses the old Spraberry trend. **End.**

A-1

CASING MILLING AND WHIPSTOCKING



By milling away a complete section in the casing before the whipstock is set, A-1 provides many advantages that contribute toward faster, more successful workovers.

1. The face of the whipstock is never touched by the milling tool.
2. Where orientation is not required, the new hole may be started in any direction.
3. Where precise orientation is required, there is no danger of milling operations causing the whipstock to rotate out of position.
4. The upper end of the whipstock rests against the exposed cement or formation rather than inside the casing. This provides a full-hole opening for free passage of drilling tools.

All milling is done with job-proved A-1 Expanding Knife Mills. Fitted with hard-faced, self-sharpening cutters, these mills cut even the hardest grades of casing without difficulty . . . complete the job with fewer trips of the cutting string. When used in conjunction with A-1 Hydraulic Feed Joints, they provide the fastest, easiest method of casing milling.

The A-1 Whipstock is easier to set . . . locks securely in position through a slip arrangement that wedges the lower section inside the casing and holds the upper section rigidly against the formation. For controlled directional drilling, the whipstock is oriented easily with standard instruments.

For the utmost in safety and economy, let A-1 do your next whipstocking job. Complete stocks of tools are maintained for quick delivery . . . experienced operators are available throughout active areas. For detailed information, ask your A-1 representative or write to our Houston office for literature.

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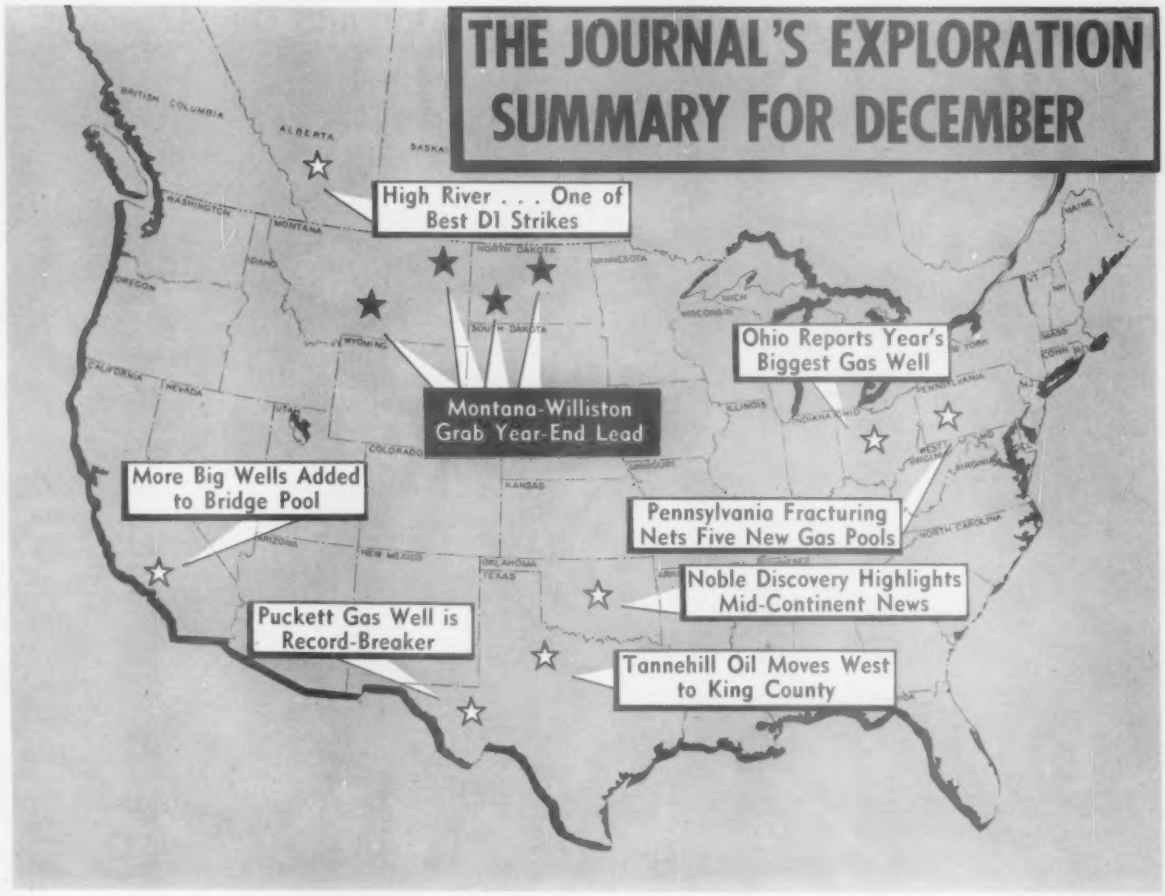
THE JOURNAL'S EXPLORATION SUMMARY FOR DECEMBER
High River . . . One of Best DI Strikes
Montana-Williston Grab Year-End Lead
Ohio Reports Year's Biggest Gas Well
More Big Wells Added to Bridge Pool
Pennsylvania Fracturing Nets Five New Gas Pools
Noble Discovery Highlights Mid-Continent News
Puckett Gas Well is Record-Breaker
Tannehill Oil Moves West to King County

Four new strikes in four different formations help . . .

Montana, Williston Basin Share Honors

by John C. McCaslin
District Editor

THE 1956 exploration story came to a significant end with Montana and the Williston basin sharing the month's success honors. Four December discoveries in four different formations drew both regional and industry attention to Central and northeastern Montana, and to northeastern and southwestern North Dakota.

A flush Silurian well . . . Amerada Petroleum Corp. completed its 1 Tange in Sheridan County, far northeastern Montana, as one of the most significant and geologically far-reaching discoveries in the country since Aneth. Initial potential of the Silurian discovery was 2,742 bbl. of oil per day on ½-in. choke, pegging it as one of the most prolific strikes in Williston's history.

The 1 Tange is important because it:

- Forces a critical look at the Silurian possibilities in Williston.
- Opened first production in Sheridan County.
- Is only 10 miles south of the Canadian border, and should stir up Canadian Silurian interest.
- Is one of the few Silurian tests in Williston history.
- Opened production in the middle of vast undrilled acreage.

An Amsden discovery . . . The Central Montana Plains, home of renowned Wolf Springs-Amsden field, added another Amsden discovery. Texota Oil Co. 1 Goffena, 25 miles northwest of Wolf Springs (the best Amsden pool yet) in Musselshell County, recovered 4,400 ft. of oil on test at 6,278-94 ft., pointing up again the not-to-be-forgotten potential of this Pennsylvanian reservoir in the Montana-Williston region.

A Heath discovery . . . Northern Pump Co. completed 1 Fritz in Billings County, North Dakota, flowing oil at the rate of 1,224 bbl. per day on 7-hour test through 24/64-in. choke. This is the best Heath well in the Williston basin to date. Location is 12½ miles south of Heath oil at Fryburg field, one of the two basin areas with such production. The other Heath field in the basin is Belfield, northeast of Fryburg.

And a Triassic hit . . . Exploratory interest was rekindled on the northeast side of the Williston basin at a Bot-

Total December Completions, Exploration and Development

	Total completions					Total wildcat wells					Cable tool comp.	Active operations
	Total	Oil	Gas	Dry	Footage	Total	Oil	Gas	Dry	Footage		
Alabama	8	5	0	3	74,732	3	0	0	3	17,625	1	18
Arkansas	114	73	2	39	321,214	20	1	1	18	66,970	9	119
California	203	156	1	46	920,612	40	2	0	38	219,180	0	234
Colorado	116	16	12	88	557,423	73	2	3	68	326,780	0	81
Florida	1	0	0	1	12,515	1	0	0	1	12,515	0	1
Illinois	257	87	8	162	564,125	64	3	1	60	123,413	65	450
Indiana	78	30	1	47	130,024	13	0	0	13	19,423	63	100
Kansas	397	186	30	181	1,386,815	85	11	7	67	338,389	40	415
Kentucky	167	80	12	75	213,567	37	4	1	32	47,961	155	255
West	152	78	1	73	179,074	37	4	1	32	47,961	140	190
East	15	2	11	2	34,493	0	0	0	0	0	15	65
Louisiana	387	203	54	130	2,863,971	71	9	7	55	673,502	0	481
North	163	90	20	53	558,002	24	3	0	21	132,130	0	168
South	182	83	29	70	1,903,328	38	3	4	31	421,255	0	240
Offshore	42	30	5	7	402,641	9	3	3	3	120,117	0	73
Michigan	38	17	0	21	127,218	18	1	0	17	61,537	28	109
Mississippi	38	10	1	27	289,063	20	1	0	19	156,029	1	41
Missouri	1	0	0	1	1,505	1	0	0	1	1,505	1	0
Montana	65	24	0	41	276,385	30	1	0	29	133,966	15	71
Nebraska	55	11	0	44	331,674	25	1	0	24	146,752	0	40
West	55	11	0	44	331,674	25	1	0	24	146,752	0	40
East	0	0	0	0	0	0	0	0	0	0	0	0
New Mexico	138	64	38	36	609,845	22	4	1	17	123,830	0	175
Northwest	66	8	38	20	219,693	13	1	1	11	52,786	0	75
Southeast	72	56	0	16	390,152	9	3	0	6	71,044	0	100
New York	51	23	1	27	69,615	1	0	0	1	3,615	51	28
North Dakota	18	12	0	6	138,425	4	0	0	4	22,840	0	35
Ohio	89	30	16	43	205,908	1	0	1	0	3,484	89	151
Oklahoma	511	298	20	193	1,753,444	69	17	6	46	319,306	85	841
Pennsylvania	167	82	9	76	328,871	4	0	1	3	27,691	167	89
Texas	1,545	877	90	578	6,629,001	454	50	23	381	2,083,571	0	1,330
Southwest (1)	117	48	2	67	314,925	51	1	2	48	156,663	0	75
Gulf (2)	55	21	12	22	319,835	25	3	4	18	150,659	0	40
Gulf (3)	140	46	20	74	999,872	49	2	6	41	396,102	0	150
Southwest (4)	107	25	24	58	591,091	44	0	4	40	225,431	0	89
East (5 & 6)	80	32	8	40	380,096	37	2	2	33	175,024	0	134
West Central (7-B)	211	112	1	98	713,768	76	10	0	66	259,829	0	120
West (7-C & 8)	418	351	3	64	2,101,291	61	12	3	46	365,428	0	461
North (9)	315	168	1	146	812,032	103	17	0	86	295,327	0	140
Panhandle (10)	102	74	19	9	396,091	8	3	2	3	59,108	0	121
Utah	11	4	1	6	61,021	5	0	0	5	29,201	0	33
West Virginia	51	8	33	10	157,828	4	0	1	3	24,091	51	206
Wyoming	101	39	1	61	338,521	36	1	1	34	159,110	19	139
Total December 1956	4,607	†2,335	330	*1,942	18,363,322	1,101	‡108	54	939	5,142,286	840	5,442
Total November 1956	4,604	2,417	316	1,871	18,442,775	1,032	106	36	890	4,811,287	772	5,390
Total 1956	58,160	31,158	4,115	22,887	233,901,721	13,034	1,613	469	10,952	62,026,699	.....	.....
Total 1955	56,682	31,567	3,613	21,502	226,270,000	12,271	1,812	353	10,106	58,958,356	8,254	.....
Western Canada	288	215	16	57	1,309,538	65	17	7	41	298,824	.....	.....
Alberta	154	107	14	33	784,629	37	8	6	23	196,631	.....	.....
Saskatchewan	104	87	1	16	448,768	22	9	1	12	88,519	.....	.....
Manitoba	26	19	0	7	55,596	6	0	0	6	13,674	.....	.....
British Columbia	4	2	1	1	20,545	0	0	0	0	0	.....	.....
Alberta 1956	1,861	1,371	138	352	9,967,437	371	62	56	253	2,137,543	.....	.....
Saskatchewan 1956	1,092	790	11	291	4,568,900	297	75	2	220	1,264,926	.....	.....
Manitoba 1956	252	195	0	57	579,704	45	3	0	42	132,765	.....	.....
British Columbia 1956	56	6	35	15	322,526	24	0	10	14	158,454	.....	.....
Canada 1956	3,261	2,362	184	715	15,438,567	737	140	68	529	3,693,688	.....	.....

*Incl. 140 service wells: Kans. 6, N. Y. 23, Ohio 10, Pa. 66, N. Texas 7, Okla. 28. †Incl. 19 cond.: S. La. 5, Miss. 2, Okla. 12. ‡Incl. 5 dist. disc. in Okla.

tineau County, North Dakota, wildcat. Leach Oil Co. 1 Smith recovered 1,700 ft. of gas in the pipe, 35 ft. of oil-cut mud, and 350 ft. of gassy oil on test of the Spearfish-Triassic, promising the second Triassic pool for this section of the basin, the other being at Newburg, 9 miles southeast.

Montana-Williston guideposts . . . The four Montana-Williston discoveries at year's end are the healthiest exploratory signs in the Williston basin in many months. The Williston basin is entering its most important wildcatting period. Renewal of acreage holdings is looming over the basin, and 1957 exploration will be now or never.

We can look for Silurian exploration in the Williston basin this year on both sides of the border. As the months roll by in 1957 there will be an increasing amount of new-pay searching throughout the basin on both sides of the border. There will be an increase in rank wildcatting in northeastern Montana and northwestern Montana, and possibly in South Central Saskatchewan. The Billings County Heath discovery may set off an inspired search for more production from the formation in southwestern North Dakota. The 1 Goffena discovery in Central Montana increases the Amsden's prestige as a major wildcat center of attraction on the Montana Plains.

The Regional Rundown

In Oklahoma . . . Ordovician exploration in South Central Oklahoma's Cleveland County is proving its merit. Anderson-Prichard Oil Corp. 1 Allison, Noble Townsite discovery, and one of the year's best in the Mid-Continent province, flowed 345 bbl. of oil in 19 hours from the Tulip Creek sand; and 225 bbl. in 19 hours from the Bromide sand. This section of Oklahoma is cur-

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and Tomorrow

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untry necessities are bought from NATIONAL
an from any other single source.

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five miles int

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As true today as in 1945, but
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Back in 1945, we ran the ad illustrated here in *Fortune Magazine* to summarize the extent of our efforts to serve the oil industry long and well.

Although more than a decade has passed, time has not altered the correctness of this message . . . with one notable exception: wherever there's "Black Gold" there's *much, much more* "Blue Iron."

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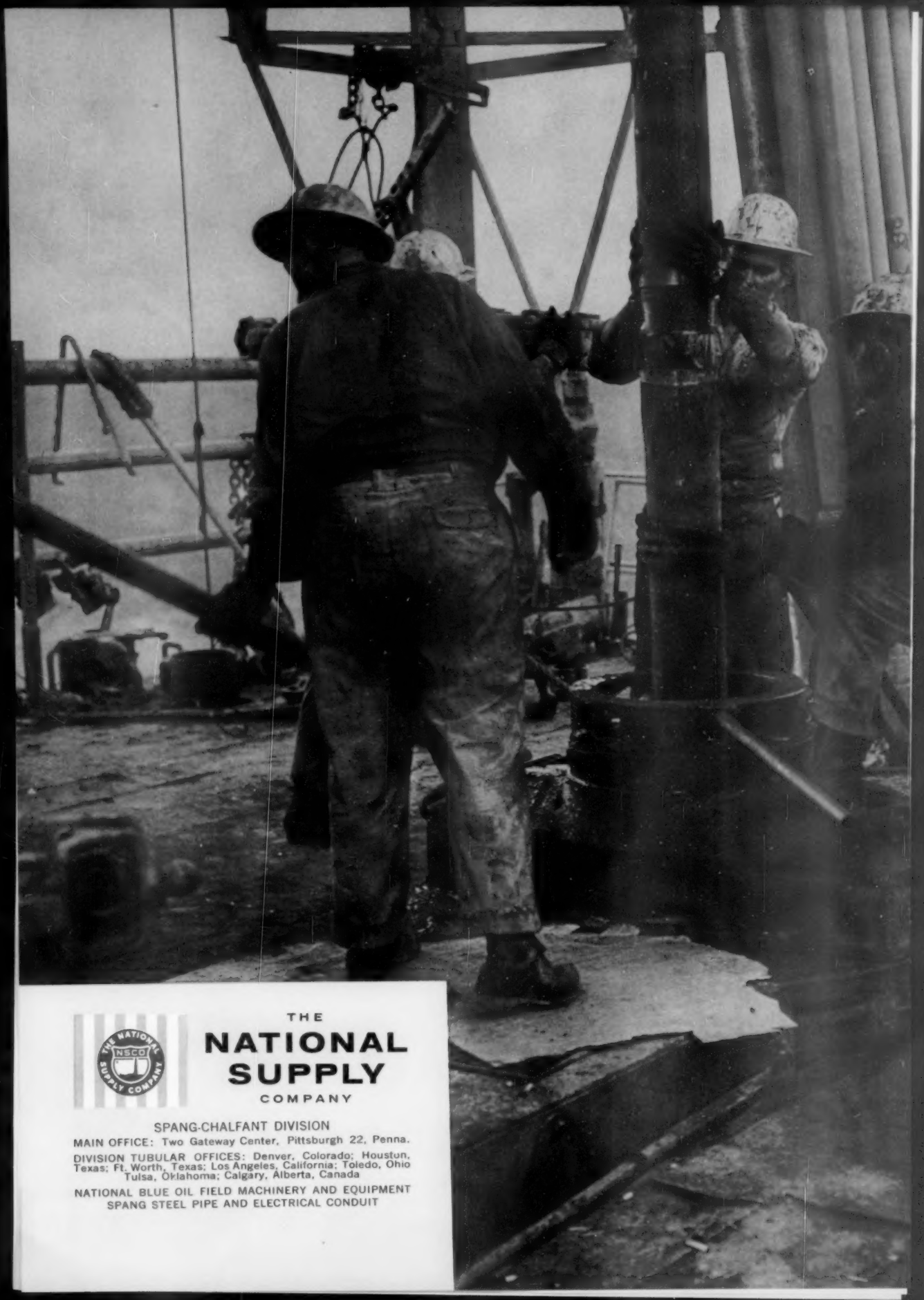

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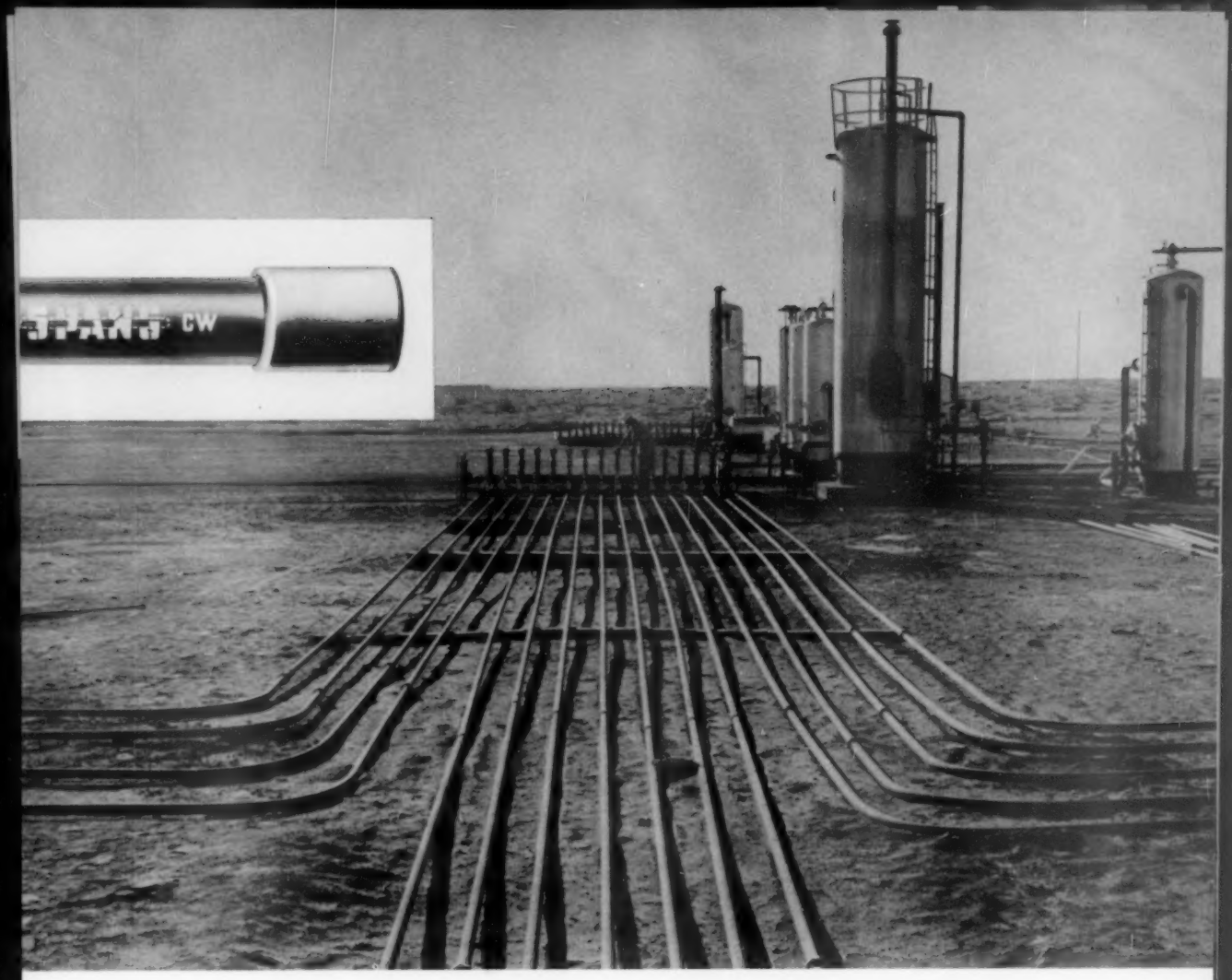

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NATIONAL BLUE OIL FIELD MACHINERY AND EQUIPMENT
SPANG STEEL PIPE AND ELECTRICAL CONDUIT

Completions By Depth Classifications—December 1956

	A 0-1,250 ft.	B 1,250-2,500 ft.	C 2,500-3,750 ft.	D 3,750-5,000 ft.	E 5,000-7,500 ft.	F 7,500-10,000 ft.	G 10,000-12,500 ft.	H 12,500-15,000 ft.	I Over 15,000 ft.
Alabama	0	0	0	0	0	0	5	0	0
Arkansas	3	63	26	16	5	1	0	0	0
California	25	34	34	48	37	15	8	2	0
Colorado	6	5	24	21	52	7	1	0	0
Florida	0	0	0	0	0	0	0	1	0
Illinois	40	94	122	1	0	0	0	0	0
Indiana	35	31	12	0	0	0	0	0	0
Kansas	3	48	188	138	19	1	0	0	0
Kentucky	105	42	19	1	0	0	0	0	0
West	104	40	8	0	0	0	0	0	0
East	1	2	11	1	0	0	0	0	0
Louisiana	11	73	40	23	41	75	62	48	14
North	10	72	35	12	27	4	3	0	0
South	0	1	5	10	13	46	53	42	12
Offshore	1	0	0	1	1	25	6	6	2
Michigan	1	6	22	4	4	1	0	0	0
Mississippi	0	0	0	6	17	7	5	3	0
Missouri	0	1	0	0	0	0	0	0	0
Montana	4	13	20	9	9	9	1	0	0
Nebraska	0	0	1	9	45	0	0	0	0
New Mexico	7	31	27	33	22	5	9	4	0
Northwest	3	23	16	5	19	0	0	0	0
Southeast	4	8	11	28	3	5	9	4	0
New York	0	50	1	0	0	0	0	0	0
North Dakota	0	0	2	1	2	13	0	0	0
Ohio	24	18	40	7	0	0	0	0	0
Oklahoma	40	188	149	45	52	30	6	1	0
Pennsylvania	0	158	1	0	6	2	0	0	0
Texas	113	331	313	306	290	134	32	25	1
Dist. 1	28	27	41	7	11	3	0	0	0
Dist. 2	5	0	4	11	19	16	0	0	0
Dist. 3	4	3	7	16	35	57	18	0	0
Dist. 4	5	11	14	15	42	15	2	2	1
East	6	8	9	15	38	4	0	0	0
Dist. 7-B	20	65	35	51	40	0	0	0	0
West	0	44	95	151	65	29	11	23	0
Dist. 9	45	168	32	38	32	0	0	0	0
Dist. 10	0	5	76	2	8	10	1	0	0
Utah	0	1	1	1	6	2	0	0	0
West Virginia	2	21	13	15	0	0	0	0	0
Wyoming	25	20	20	10	15	8	1	2	0
Total Dec. 1956	444	1,228	1,075	694	625	310	130	86	15
Total Nov. 1956	411	1,142	1,143	688	718	281	140	65	16
Total 1956	5,585	14,174	14,169	8,942	8,526	4,129	1,678	815	142
Total 1955	5,181	13,705	14,679	8,012	8,741	3,948	1,642	675	99
Western Canada	1	43	25	137	63	18	1	0	0
Alberta	0	14	19	45	57	18	1	0	0
Saskatchewan	0	7	3	89	5	0	0	0	0
Manitoba	1	22	3	0	0	0	0	0	0
B. C.	0	0	0	3	1	0	0	0	0
Canada 1956	18	387	391	1,177	1,044	210	25	9	0

rently the focal point of wildcat success.

In Ohio . . . The year's largest openflow gas well was completed by East Ohio Gas Co. in the southeast corner of Chippewa Township, Wayne County, an area in which the company is drilling several wells. The 1 Grabor flowed 4,000 M.c.f. of gas per day, natural; after fracturing it made 17,300 M.c.f. daily.

In California . . . The Texas Co. continued to bring in excellent wells in the Bridge area of South Mountain field, Ventura County. Two recent completions on the east flank of Bridge pool were brought in flowing 857 bbl. and 1,657 bbl., respectively.

In Alberta . . . The High River discovery 30 miles south of Calgary is being hailed as probably the best Devonian (1) strike to date. The Texaco wildcat flowed 326 bbl. of oil per day on restricted choke from the D1 zone of the Devonian on tests.

In West Texas . . . The gas discovery of the year, and, for that matter, ever, was completed in Puckett field, Pecos County, for a daily potential of 2,400,000 M.c.f. from perforations in the Devonian at 10,356-10,678 ft. The whopper of gas wells is Phillips Petroleum Co. 2-D Puckett.

In Pennsylvania . . . Five wildcat completions in the last few weeks indicate that the widespread hydraulic-fracturing-stimulated exploratory program in southwestern Pennsylvania is making real progress. Since the discovery of Rockton-Luthersburg and Bell Township gas fields in western Clearfield, Indiana, and Jefferson counties, operators have foscused their wildcat drilling in areas underlain by the Onondaga chert section of Lower Devonian age.

In North Texas . . . Knox County's rapidly mushrooming Tannehill sand production moved westward into King County. Robert E. Aldrich and Mohawk Petroleum Corp. 1 Ross is apparently the first discovery to be completed in this area from the Tannehill.

EXPLORATION HIGHLIGHTS

APPALACHIAN

EASTERN KENTUCKY

United Fuel Gas Co. has reached total depth of 3,146 ft. at its wildcat test 26 Fordson Coal Co. on Trace Fork in Leslie County. Significant markers include: Devonian black shale 2,695 ft., Corniferous lime 3,005 ft., Clinton shale 3,142 ft. A 9-bbl.-per-day oil show was had in the Mississippian Big Lime section 2,395 to 2,406 ft. and operators are plugging back to test same.

OHIO

Two semiwildcats were completed in opposite ends of Prairie Township, Holmes County, by H. D. Collins et al. Their 1 A. K. Watson, Section 10, gaged 1,300,000 cu. ft. natural and 2,500,000 cu. ft. after fracing Clinton sand at 3,214-44 ft.

Their 1 Earnest Rumbaugh, Section 28, gaged 200,000 cu. ft. and 475,000 cu. ft. after acidizing Newburg sand at 2,828-48 ft.

• Roy Stewart et al moved out ½-mile from production in Canaan Township, Wayne County, and brought in a gasser on 1 F. H. West, Section 27. Clinton sand at 3,295-3,301 gaged

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450,000 cu. ft. natural and 2,110,000 cu. ft. after fracture.

● Waverly Oil Works 1 C. J. Neibarger, Lot 3, Madison Township, Licking County, an outside location on the west side of the Marne pool, logged the Clinton at 2,570-94 ft. and gaged 55 bbl. oil and 1,100,000 cu. ft. gas in 24 hours after fracture.

PENNSYLVANIA

Mount Pleasant Township, Westmoreland County, Southwest Pennsylvania, Peoples Natural Gas Co., 4105 Benedictine Society wildcat is drilling with rotary at 5,595 ft.

● In East Whitfield Township, Indiana County, Columbian Carbon Co. 1839 Sam Hutchison, is drilling at 912 ft.

● No. 4109 B. H. Smithley, is at 781 ft.

● Pine Township, Pittsburgh Plate Glass Co. 1 Jess Ober, is drilling at 8,460 ft., in the Oriskany sand topped at 8,420 ft. The show of gas in the chert was fractured with no appreciable results.

WEST VIRGINIA

In Plymouth district, Mercer County, West Virginia, United Fuel Gas Co. 2-8272 Sallie L. Bailey, shallow wildcat, is cleaning out after shooting the gas pay in the Maxon sand 1,490-1,525 ft., S. D. 1,925 ft.

● Licking district, Tucker County, Hope Natural Gas Co. 10009 Thaddeus Pritt, elevation 1,812 ft., reached the Oriskany sand at 4,420 ft., with gas at 4,464-69 ft., gagging 1,917,000 cu. ft. Drilling is at 4,476 ft.

Correction

On page 161 of the January 14 issue, third paragraph, the sentence, "There are now five wells in the field, producing about 21,000 bbl. per day," should read "21,000 bbl. per month."

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ARKANSAS

Kress City Is New Lafayette Discovery

Kress City is a new oil discovery in central Lafayette County, southwestern Arkansas. The discovery well, a Smackover lime oil strike at 8,305-12 ft., is Don D. Montgomery and Associates 1 Ford, C NW NW 35-16s-24w, 2½ miles southeast of Lewisville. Production is on 6/64-in. choke. Completion flow was 237 bbl. of oil per day, 41.5° gravity. Nearest Smackover production is 6 miles south at Dorcheat-Macedonia field.

CALIFORNIA

Union Completes Third Stenderup Well

Union Oil Co. added its third well in the Derby sand, Stenderup pool activity, Mountain View field with completion of the first northwest extension for 802 bbl. daily. This newest well, 44-21 Union-Hancock, was taken to 10,026 ft. It was completed in the interval 9,659-9,983 ft. flowing 28.6°-gravity crude through a 16/64-in. choke. Union is operator in a 4,000-acre block surrounding the producing area held jointly with Hancock Oil Co. Union holds a 75 per cent interest and Hancock the balance. Location has been staked for a southeasterly test next.

Superior Revives Old McClung Field

Superior Oil Co. appears to have given an old abandoned oil field in Kern County a new lease on life with a Stevens sand pool discovery. Superior ran a 39-minute test on the wildcat, 44-33 Wesco-Clark, located ½-mile north of the abandoned McClung field,

HALLIBURTON'S
SANDOIL FRACTURING

world leader in production stimulation

THE FACT

Sandoil has been successfully used on a greater number of oil and gas producing wells than any other fracturing process.

THE REASONS

- Economy encourages extra big fracturing jobs that create greater subsurface drainage systems. The fracturing fluid is inexpensive refined or crude oils which are available world wide.
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- Continuous high-rate, variable-ratio proportioning units originated for first-in-the-field service by Halliburton.
- Diesel-powered pumping units with top hydraulic in-the-well horsepower.

THE CONCLUSION

When formation geology indicates response to fracturing, well-wise oilmen specify Halliburton's Sandoil Fracturing.

Learn more about Sandoil Fracturing. Ask your Halliburton operator for your copy of "Elements of Hydraulic Fracturing". Call the local or district office or write the Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

HALLIBURTON

PIONEERS IN FRACTURING SERVICES

251 SERVICE CENTERS—JUST MINUTES AWAY FROM ANY RIG

and reported recovering clean 35°-gravity crude at an unestimated rate. The interval tested was in the Stevens sand at 7,701-27 ft. The McClung field was discovered by Continental Oil Co. in 1943. It was completely abandoned by 1951 with a cumulative production total of 106,453 bbl.

Texaco Quits Deep Test

The Texas Co. has abandoned 1 Lawton, a closely watched 17,485 ft. wildcat in the Fairview Canyon region of Ventura County. The decision to quit was made after a fishing job on a stuck wire-line tester. The only pipe set in the hole was 45-ft. of 20-in. surface pipe and 1,575-ft. of 11¾-in. leaving 15,910 ft. of hole open. The wildcat was searching for Pliocene formations productive in the deep Fillmore field 4½ miles westward.

CANADA

ALBERTA

Red Earth Play Adds Third Well

The long awaited evaluation of Red Earth Creek's potential is now under way in northern Alberta. Union Oil Co. of California, Ltd., added the third well to the Granite Wash pool last week at 11-21 Red Earth Creek, LSD 11, 21-87-8w5, 1 mile north and ¼ mile east of the field's second well, 12-16, completed for 168 bbl. per day late in 1956, and 1¼ miles east and 1 mile north of the 12-17 discovery well, one of the most significant and newsmaking strikes in western Canada's wildcat history.

Drill-stem tests at the 11-21 extension well flowed oil with the rate not yet announced. The test was made at 4,762-82 ft. Coring and testing continue.

Red Earth Creek was discovered in February last year, setting off the biggest land rush in Canadian history. The well was one of the big news stories of the year on the wildcat front. It opened a vast virgin area of exploratory promise in northern Alberta.

Gas Flows at Elkton Strike

Exploratory work in the Elkton-Harmattan area of southern Alberta which has had its ups and downs during the past number of years, again paid off for the Home Oil Co. group last week when gas was recovered at high rate from its current wildcat in that area. Drill-stem test in the Mississippian formation at the Home-C. & E. 7-3 Elkton wildcat, flowed gas at a rate estimated to be 12,000,000 cu. ft. daily. That test was run of a 30-ft. interval in the top section of the formation and later test, reported from unofficial sources, indicated that the pay zone had been penetrated as a further evaluation just below the initial test recovered only salt water.

The 7-3 Elkton, on LSD 7, 31-4w5, is situated over 3 miles south of the previous proven limits of Elkton-Harmattan oil and gas field 1¼ miles northwest of the Oilwell Operators et al 11-35 Cremona exploratory abandonment.

BRITISH COLUMBIA

Province Has 27 Rigs Busy

Drilling activity in the northeastern sector of British Columbia, which at the present time is at a record rate, with 27 drilling rigs currently engaged on development and exploratory work, accounted for the completion of another pair of gas wells during the past week. Fargo Oils, Ltd., announced the completion of the two exploratory holes which are located on acreage being operated for it and others by J. B. White and A. M. Lloyd of Dallas, Tex. The wells are located in the Halfway Lake and Blueberry River areas on a por-

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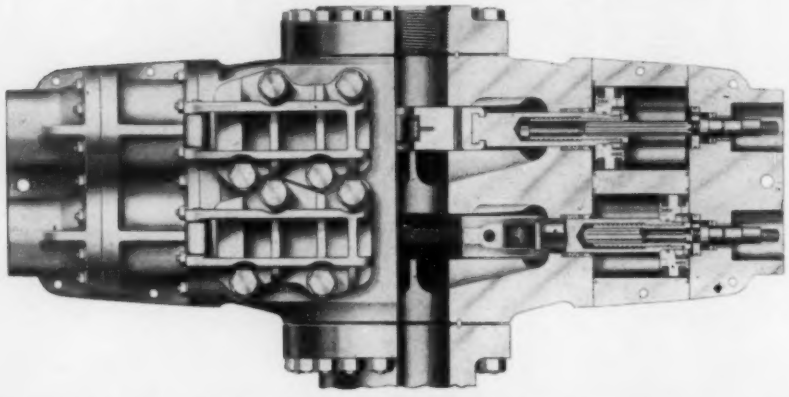
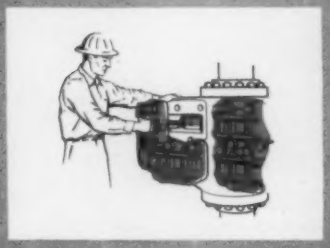
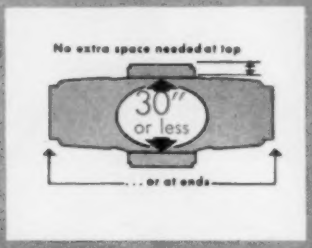


The Shaffer Hydraulic Cellar Control Gate is so unique that you can see many of its important advantages with *one* quick look . . .

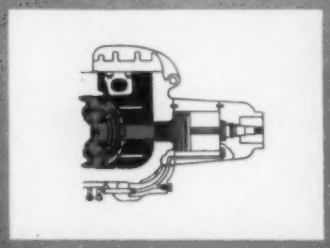


SIDE-OPENING DOORS assure you maximum ease in changing rams. Simply unbolt and open the door, slide out the ram assembly, service the rams, and slide the assembly back in place. Closing and bolting the doors automatically aligns the rams for proper operation.

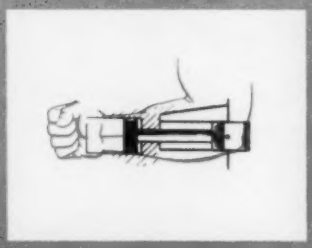
Equally important — rams can be changed with the same ease whether pipe is *in* or *out* of the hole!



SPACE-SAVING COMPACTNESS saves costly cellar space, assures more efficient hook-ups. Even in sizes as large as 13⅝" (12" Series 900) the Shaffer Double Gate, with *two* ram compartments unitized into one body, requires only 30" of vertical height—the Single Gate only 18½". Width and length dimensions are also unusually compact, saving valuable cellar space in all three dimensions!



ONE PISTON PER RAM (as seen here from the top view) means . . . (1) fewer and simpler operating parts . . . (2) fewer hydraulic seals to maintain . . . (3) simpler manifolding of hydraulic lines . . . (4) easier servicing . . . and (5) more-favorable ratio of piston area to piston circumferential seal (hence, less internal friction, greater efficiency)...advantages not found in more complicated designs.



DIRECT HYDRAULIC DRIVE with the operating cylinders directly *behind* the rams — not on the sides — assures positive action, maximum simplicity and greatest safety. There are no complex mechanisms, no yokes, no secondary connections between the hydraulic cylinders and the rams in Shaffer Hydraulic Cellar Control Gates . . . still another important engineering advantage.

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tion of 400,000 acres currently held by the team in the area.

Both wells were drilled to the Mississippian formation and have been completed as successful gassers, adding to the already substantial reserves the group has proven in this portion of western Canada.

The 3 Halway, is on projected LSD 12, 12-87-25w6, approximately 1 mile north and ½ mile west of the recent White & Lloyd-Fargo 1 Halfway discovery well. In total, the well has apparently at least five productive horizons in the Triassic zone, covering an effective pay zone of approximately 100 ft. One of those zones has been tested for production and gave up a gas flow rate estimated at 5,000,000 cu. ft. daily as well as some distillate.

The other well, White-Lloyd-Fargo 11 Blueberry, on projected LSD 10, 22-89-25w6, a 3-mile extension to the Blueberry structure, with an 85-ft. pay thickness, is capable of dry gas production from the top of that horizon and has tested up to 19 million cubic feet daily of gas with a high ratio of gas to liquid hydrocarbons. Production test operations were delayed for a time at this hole due to the proper testing equipment being unavailable for a time, but operations are now in full swing.

NORTHWEST TERRITORIES

Two Wells Slated For Territories

Drilling has begun on two wildcats in the Northwest Territories. They are on Permit No. 888 in the Tathlinia Lake region, 155 miles southeast of Fort Simpson and 38 miles south of Fort Providence, some 55 miles north of the Alberta border. D. Todd Briggs is drilling the two wells. One is the 2 Tathlinia Lake, 60 degrees 48 minutes North Latitude and 117 degrees, 18 minutes West Longitude. The 1 Tathlinia is at 60 degrees, 46 minutes, 25 seconds North Latitude and 117 degrees, 19 minutes, 30 seconds West Longitude.

Drilling began on the No. 2 well January 7. The No. 1 is preparing to start.

SASKATCHEWAN

Permit Taken for Far North Wildcat

Tidewater Oil Co. will drill a wildcat 90 miles northwest of North Battleford and 29 miles north of St. Walburg in northern Saskatchewan this year. The well is the 4-34 Meadow Lake Crown on LSD 4, 34-58-32w3, 21 miles south of a dry hole drilled by Imperial at Goodsoil.

LOUISIANA

SOUTH LOUISIANA

Deeper Pay Opened in Lake Arthur Discovery

Deeper exploration at Lake Arthur, in Jefferson Davis Parish, has uncovered a gas-condensate reservoir below 15,200 ft., the deepest so far in that area. Its discovery well, 2 Eula Roach, drilled by Union Oil & Gas Corp., is perforated in this pay at 15,224-15,305 ft. Hole was drilled to 15,461 ft. The well's flow has not been gaged, pending installation of completion equipment, but pressure through 1¼-in. tubing was 11,400 psi.

Abbeville Joins List Of 15,000-Ft. Producers

The Abbeville area in northern Vermilion Parish has been added to the list of South Louisiana fields with production below 15,000 ft.

Completion by Richardson & Bass of their 1 Amerada-Brookshire Unit, in 5-12s-3e, on the north flank of the field, is from perforated interval at 14,982-15,012 ft. Flow through 9/64-in. choke was at the rate of 2,607,000 cu. ft. of gas and 48 bbl. of 41.1°-gravity condensate per day. Pressure was 9,500 psi.

The sand is 3,000 ft. below previous deepest production in the area. The well was drilled to 16,010 ft. Location is more than ½ mile from nearest production.

Deep Discoveries Turn Light on Midland Area

Hunt Oil Co. has a deep gas-condensate discovery well 3 miles southwest of the large Midland gas area in the southwest corner of Acadia Parish. It also is about 1½ miles southeast of

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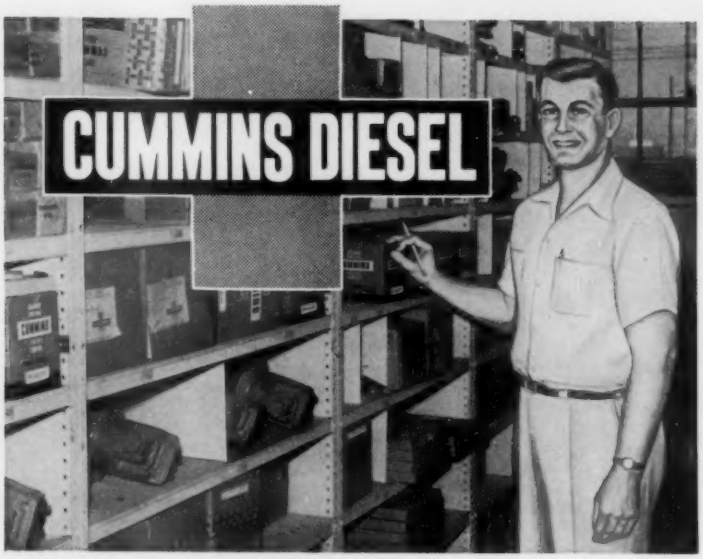

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Columbian Carbon Co.'s gas-condensate discovery well completed last October.

Hunt's discovery well, 1 Colbert Thibodaux, is shut in for market outlet after testing a flow of 2,560,000 cu. ft. of gas per day through chokes. Liquid recovery was at the rate of 59 bbl. of 46.8°-gravity condensate per 1,000,000 cu. ft. Flowing pressure hit 5,930 psi.

Production is from a lower Frio sand, perforated at 13,186-90 ft. Total depth is 13,650 ft. Columbian Carbon's well was productive from a 9,740-ft. sand.

Bearhead Creek Extension Lessens North Oretta Gap

A wildcat located slightly more than a mile southeast of Bearhead Creek field, in Beauregard Parish, is proving productive from two Cockfield-Yegua zones to provide another link in closing the 2½ mile gap between that field and North Oretta field.

The new discovery is by Slick Oil Co. at its 1-B Musser Davis, in 17-6s-11w, which tested 67 bbl. of 48°-gravity oil per day from perforations at 8,426-27 ft., and 1,000,000 cu. ft. of dry gas per day from a higher pay at 8,148-51 ft.

The lower zone was tested through 7/64-in. choke with flowing pressure of 700 psi. Gas-oil ratio was 2,000 cu. ft. per barrel. Flow of the upper pay was through 5/32-in. choke under pressure of 900 psi. Hole had been drilled to 8,900 ft.

MICHIGAN

Hillsdale Wildcat May Be of Importance

Deepened approximately 47 ft. more in Trenton, from 3,734 ft. to 3,780 ft., Clifford A. Perry 1 Houseknecht, NW SE NE 10-5s-3w, Scipio Township, Hillsdale County wildcat, appeared to have logged increases in gas with oil showing in the last two feet drilled.

This significant Hillsdale County Trenton-oil and gas-showing wildcat has been drilled approximately 120 ft. of almost continuous gas and oil-showing pay. Only reported spray-flow tests of oil showed recovery of 5 bbl. of oil in 11 hours through a 1-in. opening and about 7½ bbl. of oil in 5 hours through a 2-in. opening. Gas showing at present depth appears to have increased to an estimated 2,500,000 to 3,000,000 cu. ft. from a gaged 1,300,000 cu. ft. that showed at original total depth, 3,734 ft. Top of Trenton was logged at 3,575 ft. Sub-zero weather conditions were delaying cable tool

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7 Cr, ½ Mo	3½ Ni
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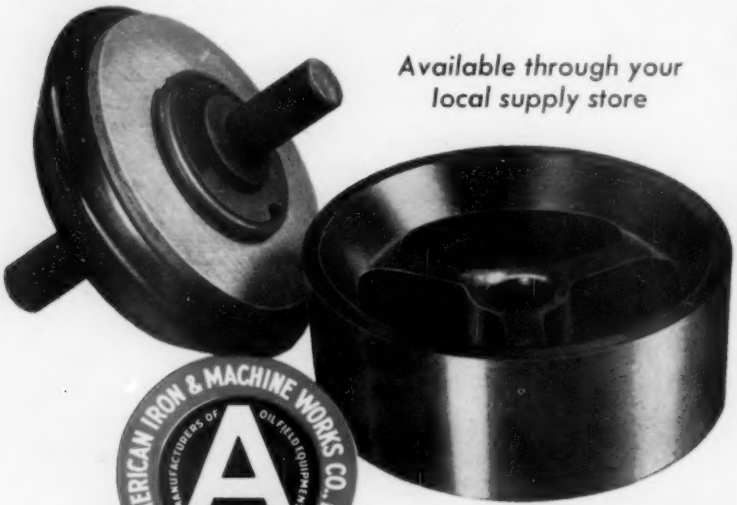

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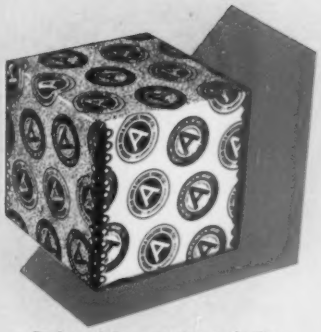

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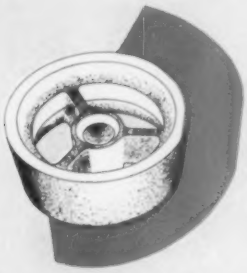
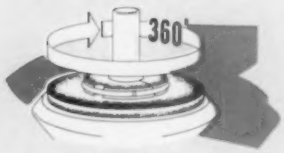
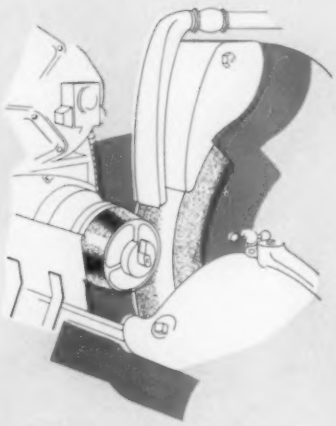


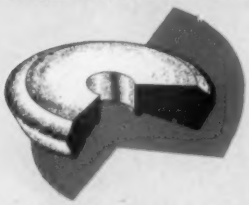
Three-web design of American Iron Valve Seats enables seats to absorb terrific pounding of modern high pressure pumps while providing maximum fluid passage.



Split-ring retainer is standard equipment. This retainer gives 360° support to insert, preventing chipping or cracking of rubber compound.



American Iron Seats are precision ground for perfect seal in pump part. No other production method gives the perfect seating surface as this automatic honing machine.



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deepening in an open hole at this wildcat, but Perry did indicate that he will drill further to determine extent and thickness of this oil-showing section which he believes that he has only scratched.

This wildcat is strictly one that should be placed in the "rank" category and therefore its importance may be greater than it now appears. A definite gas discovery is all but assured in the Trenton, with excellent prospects of oil production.

A 50-gal. acid treatment to Traverse oil shown appeared to have improved prospects for a new Wayland Township, Allegan County, Traverse oil discovery at Ford Henry 1 Cook, SE SW SE 6-3n-11w. Well had recovered 40 bbl. of net oil, plus a large amount of cave which was hindering oil flow, in 20 hours following treatment. Traverse lime was logged at 1,694 ft. Hole was drilled to 1,712 ft., total depth. Oil pay was tapped between 1,696-1,703 ft. Additional porosity may have been drilled between 1,708-12 ft. Hole carried 400 ft. of free oil, no water natural in 40 hours. Acid increased amount of gas showing from Traverse oil pay.

KANSAS

SOUTHWEST KANSAS

Inside Hugoton Well Is Morrow Prospect

A wildcat inside Hugoton field production, 3 miles west of Satana in Haskell County, has indicated production from the Morrow sand at 5,350-80 ft. The discovery prospect is Trees Oil Co. 1 Moore in C NW NW 21-30-34. A drill-stem test in the Morrow flowed gas at the rate of 1,000 M.c.f. daily.

A new discovery for the Cambridge arch in northwestern Kansas is in prospect at Stickelman & Betts 1 Beck, NE SE SE 28-2s-28w, Decatur County. Recovery on drill-stem test at 3,614-50 ft. was 2,800 ft. gassy oil. Other tests recovered clean oil. Pay is the Kansas City lime-Pennsylvanian. Location is 3½ miles northeast of Oberlin, Kans. Closest production on the arch is 8 miles northeast at Monaghan, and Warner field, 12½ miles northeast.

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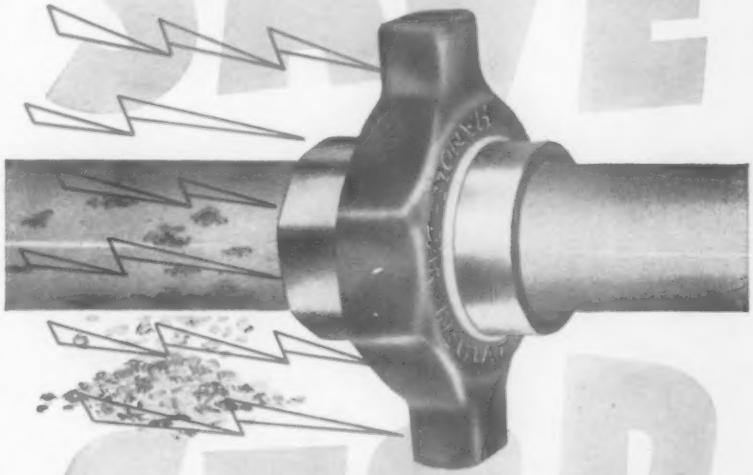

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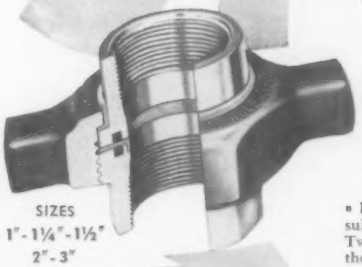

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NEW MEXICO

NORTHWEST NEW MEXICO

Tocito Discovery In Rio Arriba

Rio Arriba County in the San Juan basin gained a new Tocito gas producing area. The discovery well is Southern Union Gas Co. 6 Jicarilla "E," SE NW NE 21-26n-4w.

The well flowed 5,663 M.c.f. of gas per day from perforations at 7,140-53 ft. in the Tocito on ¾-in. choke. The Tocito-Upper Cretaceous is a new-pay discovery for the area where other production is from the Pictured Cliffs at 3,000-4,000 ft.

SOUTHEAST NEW MEXICO

New Pay Opened in Lea County Field

Queen sand has been added to the one-well Pearl-Pennsylvanian field in central Lea County.

Shell Oil Co. 1 Allen estate, 27-19s-35e, 1 location south of the field discovery, has been completed for a calculated daily potential of 257 bbl. of 35° oil. Pay perforations were between 4,882-90 ft.

Continental Oil Co. 9-B-15 Britt, deep test in the Skaggs (3,800-ft. Grayburg) field, has had oil shows in the Tubb, Drinkard and Pennsylvanian sections.

The well flowed 13 bbl. of oil in 1 hour from the Tubb at 6,447-65 ft.; recovered 1,085 ft. of oil and 50 ft. of gas-cut mud in the Drinkard lime at 6,790-6,907 ft., and recovered 2,491 ft. of oil on a 3-hour test of the Pennsylvanian at 7,700-34 ft. It was to drill ahead for further testing.

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Short Junction Field Adds Well 191

The 191st producing oil well has been completed in Cleveland County's renowned Short Junction field. Carter Oil Co. 1 Siler, C NW SE 26-10n-4w, flowed 48 bbl. of 39.5°-gravity oil and 12 bbl. of water in 14 hours on 20/64-in. choke from perforations in the Hunton lime at 8,132-70 ft.

Casing Set at Offset To Deep Knox Discovery

One of the most closely watched wildcats in the region is British-American Oil Producing Co.'s north offset to the record-breaking deep 2 Harrison discovery in Knox pool, Grady County, the 1 Reed, SW SW NE 20-3n-5w.

The 1 Reed, 1 mile north of 2 Harrision, went to 15,772 ft. Casing is set at 15,748 ft. in the third Bromide san. Here are the log tops:

. . . Viola lime at 14,290 ft.
. . . Bromide dense at 14,860 ft.
. . . Bromide zone at 14,988 ft.
. . . Second Bromide sand at 15,218 ft.
. . . Third Bromide sand at 15,420 ft.

Last February British-American's 2 Harrison was completed for a calculated potential of 175,000 M.c.f. of gas per day with 26,075 bbl. of distillate. Production was from open hole in the third Bromide sand at 15,250-15,310 ft., a new producing-depth record for Oklahoma.

OKLAHOMA PANHANDLE

Offset at Northwest Highland Is Success

The second producer in new Northwest Highland field in Beaver County flowed 3,770 M.c.f. of gas per day from Hoover sand at 4,350-4,410 ft.

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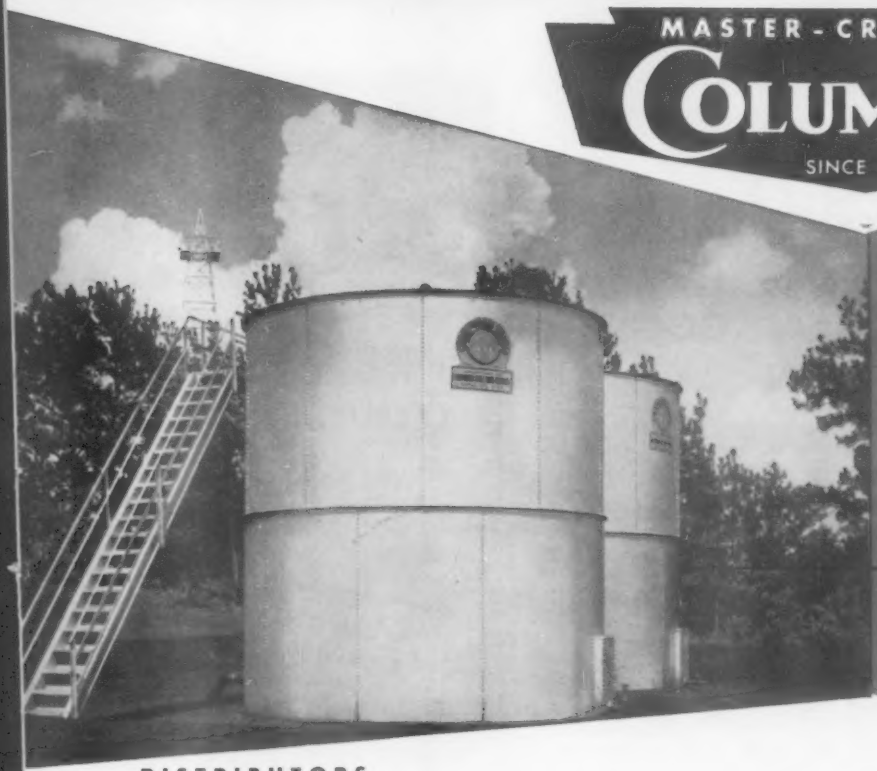

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and had gas shows in the Chester-Mississippian at 7,185-95 ft., hinting a new pay for the pool. The offset discovery is Shell Oil Co. 1 Barby Unit, C NW SE 6-3n-28eCM.

Log tops reported are:

. . . Hoover-Penn at 4,351 ft.
. . . Missouri-Penn at 5,372 ft.
. . . Tonkawa-Penn at 5,429 ft.
. . . Des Moines-Penn at 6,092 ft.
. . . Atoka-Penn at 6,769 ft.
. . . Morrow-Penn at 6,868 ft.
. . . Chester-Miss. at 7,173 ft.

Deep Beaver Test Drills Ahead

Phillips Petroleum Co.'s deep Beaver County test, the 1 Blakemore, C NW SE 36-4n-20eCM, has proved Chester-Mississippian pay and is drilling on down.

A test of the Chester at 6,524-58 ft. flowed 60 M.c.f. of gas daily in 24 minutes. Recovery was 6,190 ft. of oil, 36° gravity.

Good Extension Well Finaled at Camrick

Big Camrick-Morrow field in Beaver County's west end added another good gas well last week. Carter Oil Co. 1 Lehmann Unit, NW NW SE 30-1n-20eCM, made a calculated open flow of 28,750 M.c.f. of gas per day. The well flowed 224 bbl. of condensate per day from the Morrow at 7,441-78 ft. on ½-in. choke with 8,250 M.c.f. per day.

Another well in the field, Lynn Drilling Co. 1 Williams, SE SE NW 32-1n-20eCM, is reporting an oil flow from the Morrow through perforations at 7,276-7,306 ft.

ROCKY MOUNTAIN

COLORADO

Harrington Will Drill Well in Kiowa County

A wildcat is scheduled for Kiowa County on the Las Animas arch, 2½ miles southeast of Continental Oil Co.'s 1 Lynn, the first real commercial oil well on the southeastern Colorado structure.

The new well is D. D. Harrington 1 Morse "A" in C SE NW 28-20s-48w. Continental completed the 1 Lynn discovery 2 weeks ago in C SE NW 13-20s-49w, for 240 bbl. of oil daily from the Marmaton-Pennsylvanian. The well gave the arch its first good oil production and will set off a new flurry of interest in southeastern Colorado exploration.

Location Made for Wildcat in San Miguel

A wildcat is slated for the Colorado portion of the Paradox basin. The interesting well will be Reynolds Mining Corp. 1 Warren, C SW SW 24-43n-19w, San Miguel County in the southwestern part of the state.

The well will go to the Paradox. It is located 2 miles south of a 10,220-ft. hole drilled by Reynolds 2 years ago at 1 Egnar in C NW NW 14-43n-19w. That well had some shows on drill-stem tests in the Paradox, topped at 4,955 ft.

NEVADA

Three Wells Slated For Clark County

Three Pennsylvanian wildcats will be drilled in Clark County by Matador Oil Co. All three will be located south of Las Vegas. Two of the wells are old holes, the third a new location.

Matador will deepen the 1-X Wilson in SW NW NE 27-22s-60e, from 2,020 ft. to the Pennsylvanian. The 1 Government in NW NW NE 32-22s-63e will also go on down to the Pennsylvanian. The new location is 29-1-X, C SW SW 29-22s-60e.

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Tips on Mud Valves for Toolpushers . .

Zack Taylor (right) and Toolpusher Jim Wilkson discuss the MUDWONDER on the standpipe of the Falcon-Seaboard Rig No. 9.

Mud Valve Economy, Easy Operation Found In Rockwell-Built MUDWONDER

by Zack Taylor, Division Manager
Falcon-Seaboard Drilling Company, Denver, Colorado

ECONOMY . . . Easy operation . . . Have you searched in vain for mud valves that would give you these benefits? We did until our experience with Rockwell-Built *Mudwonders*. Now, we use them on standpipes, mudlines, mud tanks, blowout preventers, etc. Eight months of testing and using *Mudwonders* proved to us that they are superior to any mud valve we have ever used, regardless of application.

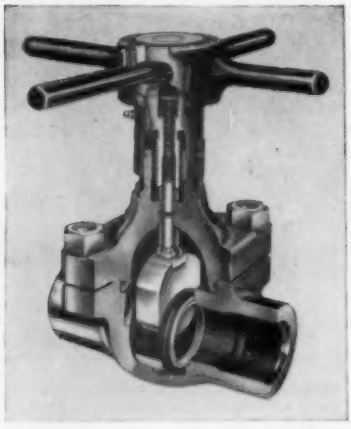
Economy means more to us than just long wearing parts which are inexpensive to replace. It means freedom from downtime and costly maintenance, too. *Mudwonder* valves give us "our type" of economy. We can inspect the inside of a *Mudwonder*, change the seat insert if necessary, and be ready for operation again while the crew makes a connection.

We never need a cheater or hammer on a *Mudwonder* valve. Easy operation is no longer a roughneck's dream. It's real . . . and at extreme differential pressures, too.

We can recommend *Mudwonder* to any toolpusher having mud valve trouble. *Mudwonder* valves are built in 2", 3", and 4" sizes with screwed or flanged ends for 2000 psi WP (4000 psi test) and 3000 psi WP (6000 psi test).

See your favorite oil field supply store for complete information, or write Edward Valves, Inc., East Chicago, Indiana.

MUDWONDER cut-away view shows the double thread construction, separated stainless stem and hard chromed gate with "T" slot connection and the one-piece seat insert with the buna-N molded integrally over the steel wear rings.



(Advertisement)

WESTERN NEBRASKA

Testing Reported at Kimball County Well

Recovery on a 2-hour drill-stem test in Dakota sands at a Kimball County wildcat was 300 ft. of oil at 6,771-76 ft. The wildcat is Balderson Drilling Co. and Stuarco Oil Co. 1 Schmid, C NE NE 26-16n-57w, 1½ miles south of Transit Syndicate 1 Smith, a 1955 oil discovery at 9 bbl. per day. Testing continues at the 1 Schmid in the "D" sand.

Perforations Due at Cheyenne Discovery

John W. McKnab 1 Rabass, C NW NW 23-15n-52w, Cheyenne County, is an indicated "J" sand discovery. The operator is perforating in that sand.

A drill-stem test at 5,307-17 ft. got 1,005 ft. of clean gassy oil and 300 ft. heavily oil and gas-cut mud.

Kimball County Wildcat Tests on Pump

Braden Drilling Co. and Stuarco Oil Co. 1 Wykert, C NE NE 5-16n-56w, Kimball County "D" sand discovery, pumped 6 bbl. of oil per hour from perforations in the "D" sand at 6,518-6,666 ft. Location of this new strike is 2 miles northeast of Dolcater field, a "J" sand producer. Testing continues at the 1 Wykert.

UTAH

Superior Bags One Southeast of Aneth

Exploratory success is continuing to highlight the news in southeastern Utah's Paradox-Aneth trend area in the Paradox basin.

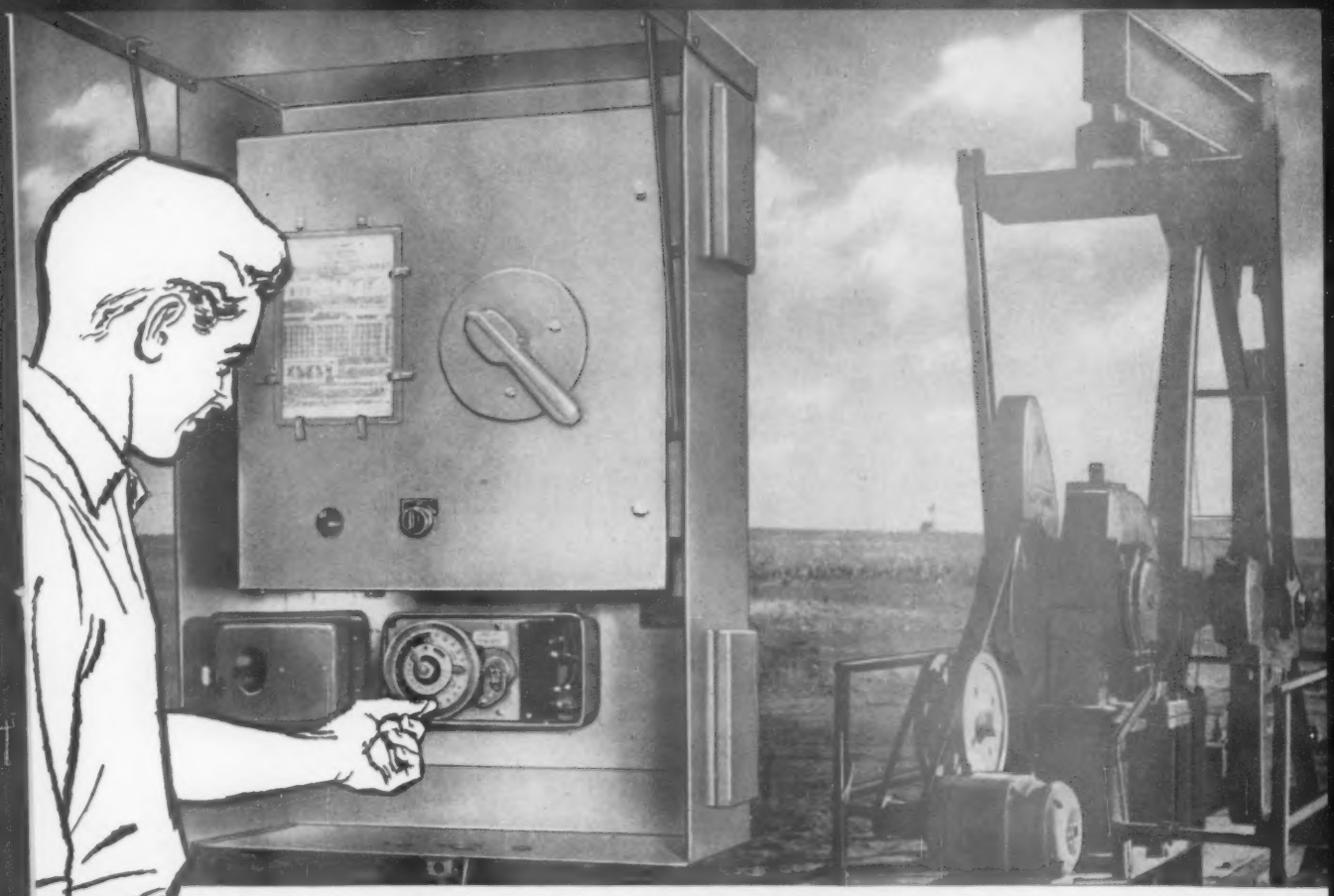
Superior Oil Co. reportedly is completing its 1 Navajo-C as a Paradox-Pennsylvanian discovery in SE SE SE 31-40s-25e, San Juan County. No details are available at this writing as to tests or potentials.

Location is 3 miles southeast of the south side of Aneth field. This is the first success in 25e. Drilling just east of Aneth field to this time has been unsuccessful.

North Desert Creek Adds Third Well

North Desert Creek field in San Juan County added its third well. The new success is Phillips Petroleum Co. and Aztec Oil & Gas Co. 1-A Desert-Navajo-Tribal in SE NW NW 18-41s-24e.

The operators are running pipe at



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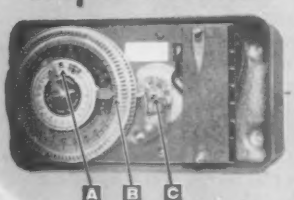
New CUTLER-HAMMER Supertimer



This is *automation* in action. You pre-set the Supertimer to meet your field allowable and the control will do the rest, automatically. It starts, stops, restarts and cycles indefinitely, precisely according to your schedule. If a power outage occurs, any number of C-H controlled pumps can be restarted in an exact sequence to avoid overloading the power lines on inrush. Unfortunate coincidental starting of even two pumps is impossible.

- **A** Sets the precise restarting time delay from zero to 180 seconds. This is exclusive with the Supertimer—random starts or coincidental starts of even two pumps are impossible.
- **B** Sets the daily pumping schedule—pull a tab for each fifteen minutes of pumping, space them through the daily 24 hour period as desired.
- **C** Sets the weekly pumping schedule—1, 2, 3, 4, 5, 6 or 7 days per week as desired.

COMPLETE PROTECTION
The control is protected against lightning with exclusive, advanced-designed lightning arresters; and the three coil overload relay protects the pump motor from overloading and dangerous single phasing which often results from lightning.

CHIMNEY DRAFT VENTILATION
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DUST SAFE CONTACTS
Dust-Safe vertical contacts stay clean and eliminate the necessity of contact replacement common to other designs.

the well. A drill-stem test at 5,902-6,034 ft. had recovery of 150 ft. heavily gas-cut mud, and 200 ft. of oil-cut mud, 50 per cent. This well is the southeast 80-acre offset to the discovery well of the field. Shell Oil Co.'s field-opener flowed 1,440 bbl. of oil per day.

WYOMING

Ohio Recovers Clean Oil at Carbon Wildcat

Ohio Oil Co. 1 Unit, a Carbon County wildcat, recovered 2,870 ft. of clean oil and 180 ft. of mud and gas-cut oil on a ½-hour drill-stem test at 5,400-17 ft. in the Lakota.

Top of the Lakota is 5,369 ft. A drill-stem test at 5,369-5,402 ft. also recovered oil—815 ft. of clean oil and 180 ft. of oil and gas-cut mud.

The discovery well is 2 miles northeast of Rock Creek field, a World War I discovery area. Production is from Muddy, Dakota, Lakota, and Sundance.

Powder River Basin Well Running Logs

Tennessee Gas Transmission Co. is running logs at its Campbell County discovery in Powder River basin. The 1 Cole, C NE NE 23-50n-76w, recovered 2,000 ft. of gas, 20 ft. of clean oil, and 60 ft. of mud-cut oil on a test at 6,748-65 ft. Top of the Lewis-Upper Cretaceous is 6,093 ft. The indicated strike is 38 miles east of Buffalo, Wyo.

What's for 1957?

With a record year behind it as far as drilling is concerned, the Rocky Mountain province expects another bright wildcat and development year in 1957.

In Williston . . . This basin may well be the newsmaker in exploration in 1957. Already two of its most significant discoveries since Beaver Lodge have begun the new year—Tange and Fritz. Amerada's 1 Tange, a 1956 well, but officially completed early this year, was the biggest Silurian well in the basin. The Northern Pump Co. 1 Fritz in Billings County, North Dakota, is a new Heath pool-opener, flowing 1,400 bbl. of oil per day.

In Four Corners . . . Last year's emergence of the Paradox basin as a major oil producing region was the exploratory highlight of 1956. Exploration in this region will hold top spot again in 1957. Wildcatting and development work in and around the Aneth trend will continue heavy. The trend may well extend over into Colorado this year.

San Juan . . . Development drilling in northwestern New Mexico's gas and new oil areas will probably set a new record for this province in 1957.

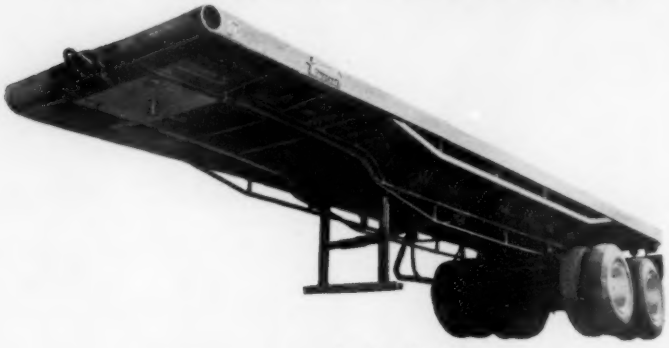
In Montana . . . Montana set a new drilling record in 1956 and may do it again this year, held strong by activity on the Central Montana Plains.

In Colorado . . . Drilling will pick up on the western slopes of Colorado, but will continue slow in the Denver basin.

However, a stepped-up campaign is probable along the Las Animas arch in the southeastern corner of the state as a result of Continental Oil Co.'s recent Marmaton-Pennsylvanian discovery in Kiowa County, the first commercial oil producer on the long arch which separates the Denver and Anadarko basins.

In Nebraska . . . Western Nebraska will continue to hold the Denver basin in the busy column, despite the decline in northeastern Colorado. Banner, Cheyenne, Kimball, Morrill, and other counties in the area will get fairly busy this year. Continued interest in the Cambridge arch possibilities is expected. Current successes in Decatur County, Kansas, promise further work along

Why LOADCRAFT Trailers are FIRST CHOICE



among oil field users!

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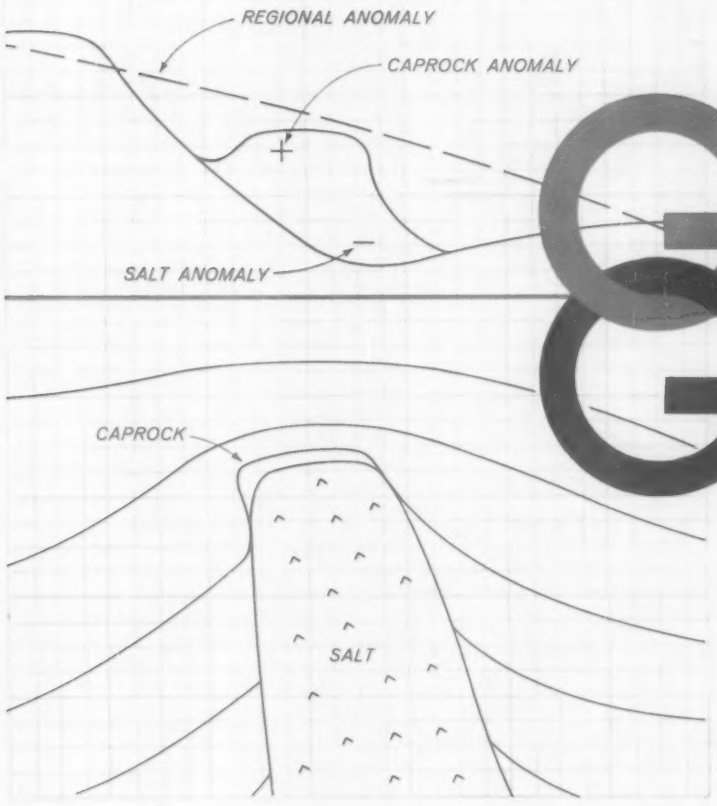
GRAVITY PROFILE OVER AN IDEALIZED SALT DOME



GRAVITY GEOLOGY

This diagram illustrates a gravity profile over an idealized salt dome. The salt, being of lesser density than the surrounding strata, produces a negative anomaly; the very dense caprock produces a positive anomaly.

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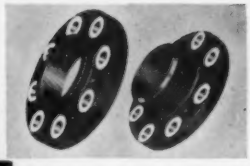

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this regional structure which separates the Denver and Central Nebraska and Salina basins.

TEXAS

TEXAS PANHANDLE

Panhandle Wildcat Is Regional Depth Record

A deep 16,000-ft. wildcat in Hemphill County, 10 miles northeast of Glazier in Section 43, Block 12, H&TC Survey, is the Texas Panhandle's deepest hole.

The record-breaker is Magnolia Petroleum Co. 1 D. D. Feldman. Production tests are slated from the top of the hole to total depth of 15,997 ft. Bottom of the hole is in Ellenburger.

A rundown on tests . . . The wildcat flowed 1,500 M.c.f. of gas per day on a drill-stem test in the Tonkawa-Pennsylvanian at 7,562-7,608 ft. Recovery was 275 ft. of heavily gas-cut mud. Net pay is about 100 ft. of Tonkawa sand.

. . . A Morrow test at 11,433-11,531 ft. got 110 M.c.f. of gas per day from about 70 ft. of Morrow pay. If the well should complete here it would also be the Panhandle's deepest production. The region's current deepest producer is at Laketon-Ellenburger field in Gray County.

. . . A test in the Marmaton-Pennsylvanian at 9,045-9,150 ft. got 192 M.c.f. of gas per day with recovery of 245 ft. of gas-cut mud.

The significant hit, which would open the second field in the county if successful, is in the northeast part of the county—4½ miles west of the Oklahoma line and 3 miles south of Lipscomb County, Texas, border.

WEST CENTRAL TEXAS

Rank Wildcat Set In Coryell County

General Crude Oil Co. has scheduled an 8,500-ft. wildcat in southeastern Coryell County. Location is 660 ft. from south and 2,550 ft. from east lines of R. T. Davidson Survey, or 5 miles west of Moody (McLennan County). The test will be drilled as 1 Ernest Day. Ground elevation is 720 ft.

In 1954 Shell Oil Co. attracted attention to this area when it found gas shows in the Ellenburger at its 1 Purcell, in northern Williamson County, which is about 35 miles southwest of General Crude's new location.

Shell drilled its 1 Purcell tight, and when rumor got around that it had gas shows, it set off one of the biggest

Now! Enter against pressure safely...

at any time!

Diagram and cutaway view of COSASCO Access Nipple with plug installed. (Formerly the Scotch Nipple).

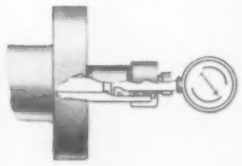
Wherever COSASCO Access Nipples are installed, you can go in against pressure with ease and perfect safety. At well heads, either the production string or annulus can be entered for instrument work. At refineries or along pipe lines, samplers, thermocouples, hydrogen probes, or coupons for corrosion studies can be inserted *without interfering with operations!* And expensive valves or other externals can be replaced or removed at will and without loss of pressure or product.

The COSASCO Access Nipple has a removable low carbon grade 303-304 stainless steel plug which, when turned down on the fine threads in the nipple outlet, effectively seals off the nipple at a tapered seat below. By-pass holes in the plug wall, between primary and secondary seals, provide communication through the plug to the exterior when the plug is backed out against a safety ring run down on the pipe threads on the nipple body.

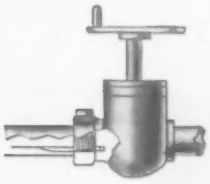
How entry is gained

With the COSASCO Retriever (Lubricator) and a full-opening valve mounted on the Access Nipple, COSASCO plugs, coupon holders or other units for inspection, testing, sampling, can be installed and removed at will regardless of pressure and without equipment shutdown. Details will be supplied promptly, on request.

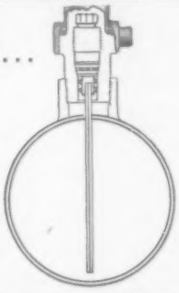
How **COSASCO** *Access* Nipples are used...



As a gauge valve, with plug installed. Gauge screws into end of plug.



As a valve re-installation nipple, with a thread and seat protector replacing the plug.



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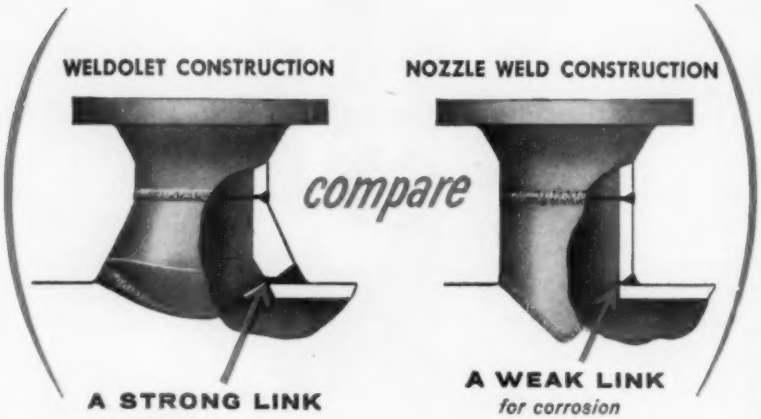
to your piping drawings for all branch connections



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General Crude Oil Co.'s wildcat in southeastern Coryell County should have a look at the Ellenburger in drilling to 8,500 ft. Map also shows Shell's dry hole in Williamson County, which set off a lease play in 1954 when it had shows in the Ellenburger.

leasing campaigns ever seen in that section of Texas.

No. 1 Purcell did have Ellenburger gas, but it proved noncommercial. After thoroughly testing the formation, it was given up as dry in September 1954. On elevation of 1,074 ft., this well had top of the Ellenburger at 6,930 ft. Approximately 1,000 ft. of Cambrian rocks were penetrated before the test was abandoned in granite. Total depth was 9,479 ft.

Geological location of these two tests is on the southeastern flank of the Bend arch, and west of the Luling-Mexia-Talco fault system. It is in a big area running north-south that has not been drilled.

Nolan, Fisher Counties Complete Discoveries

In southwestern Nolan County, C. L. Norsworthy, Jr. 2-A Virginia Baker, 122-1A-H&TC, has been completed as a Strawn discovery, or 1-mile extension on the eastern side of Nena Lucia field.

Potential was 273 bbl. of 43° oil through 18/64-in. choke, from perforations at 6,944-74 ft. Gas-oil ratio was 1,270:1. Tubing pressure was 150 psi. Top of pay was 6,936 ft. on elevation of 2,536 ft.

Operators have asked for new field designation of Nena Lucia, East. Location of the well is 1 mile east and slightly north of Sun Oil Co. 1-B Virginia Baker in Section 123, recently completed as an extension to Nena Lucia field. Sun's well flowed 222 bbl. of oil a day from pay at 6,887-6,907 ft.

Fisher County . . . Sinclair Oil & Gas Co. has completed its 1 Mose Newman as a Swastika (Cisco) discovery, 4 miles southeast of Longworth. Location is in Section 12, Block K, T&P Survey.

Daily potential was 363 bbl. of 41° oil through 24/64-in. choke. Gas-oil ratio was 287:1 and flowing tubing

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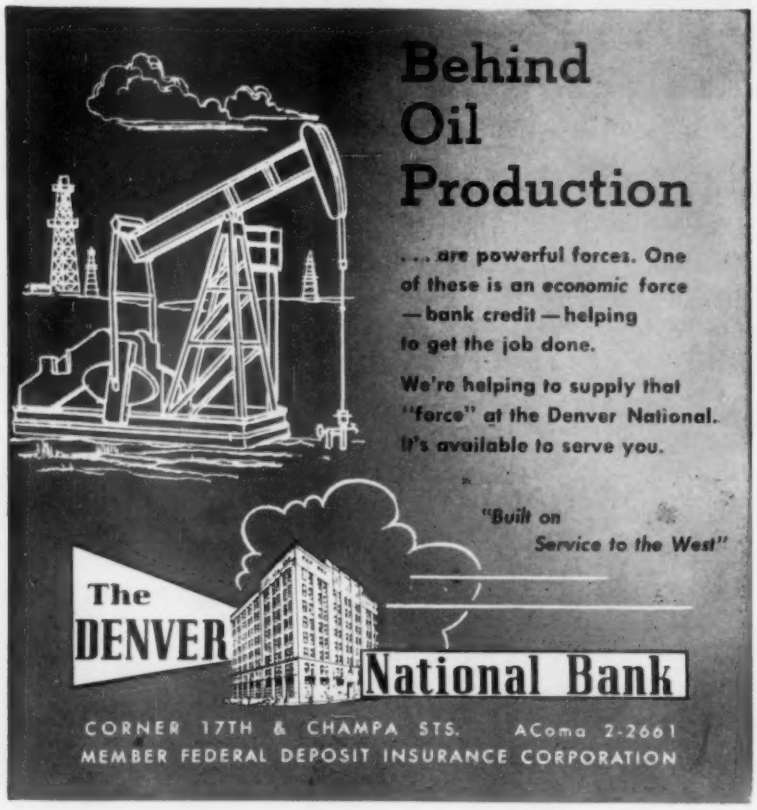
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pressure 115 psi. Operators reported top of the sand at 3,866 ft. on ground elevation of 2,064 ft. Final perforations were at 3,866-72 ft. Daily allowable on the well was 80 bbl.

Sun Oil Co. owns half interest in the well and the 160-acre drillsite. Sinclair holds 4,856 acres in the vicinity. The discovery was drilled by Dual Drilling Co., San Angelo.

Following completion of 1 Newman, Sinclair was ready to start work at its 1 Margaret Newman, located ¼ mile west of the discovery. Projected depth was 6,600 ft., to take a look at the Cambrian sands. Location falls in Section 13, Block K, T&P Survey.

WEST TEXAS

Garza Strawn Strike Makes Oil Flow

Paul C. Teas 1-A Slaughter, Strawn discovery 5 miles southwest of Post in Garza County, was ready for completion after making a flow test at the rate of 20 bbl. an hour.

The flow was through open 2-in. tubing, from perforations in the Strawn at 8,359-94 ft. Total oil recovered in 4 hours was 80 bbl. Top of the Strawn was 8,141 ft. On an initial test of the Strawn, from 8,379-94 ft., gas surfaced in 5 minutes and recovery in 4 hours was 7,125 ft. of oil. Flowing pressure in 30 minutes was 2,250 psi.

Location of 1 Slaughter is in Section 31, Block 1, Jasper Hays Survey. Operators were ready for completion tests at last report.

Crane County prospect . . . Shell Oil Co. 1-A Edwards, deep test on the eastern edge of Edwards field, extreme northern Crane County, has had shows in the Pennsylvanian.

On initial tests at 9,106-96 ft., recovery was 900 ft. of oil and gas-cut mud. Time of the test was not reported. On test at 9,196-9,257 ft., open 3 hours, gas surfaced in 50 minutes and recovery was 360 ft. of heavily gas and mud-cut oil. Maximum flowing pressure was 170 psi., and 30-minute shut in pressure reached 1,520 psi.

Location of 1-A Edwards is in NW NW Section 1, Block B-23, PSL Survey, 9 miles southwest of Penwell.

Gulf Oil Corp. 101 Henderson, Pennsylvanian prospect 7 miles northeast of Judkins, Crane County, swabbed 312 bbl. of new oil and 73 bbl. of water from perforations at 7,345-7,420 ft.

Pay Logged in Midland County Wildcat

Murphy H. Baxter 1 Willis, eastern Midland County wildcat, has had oil

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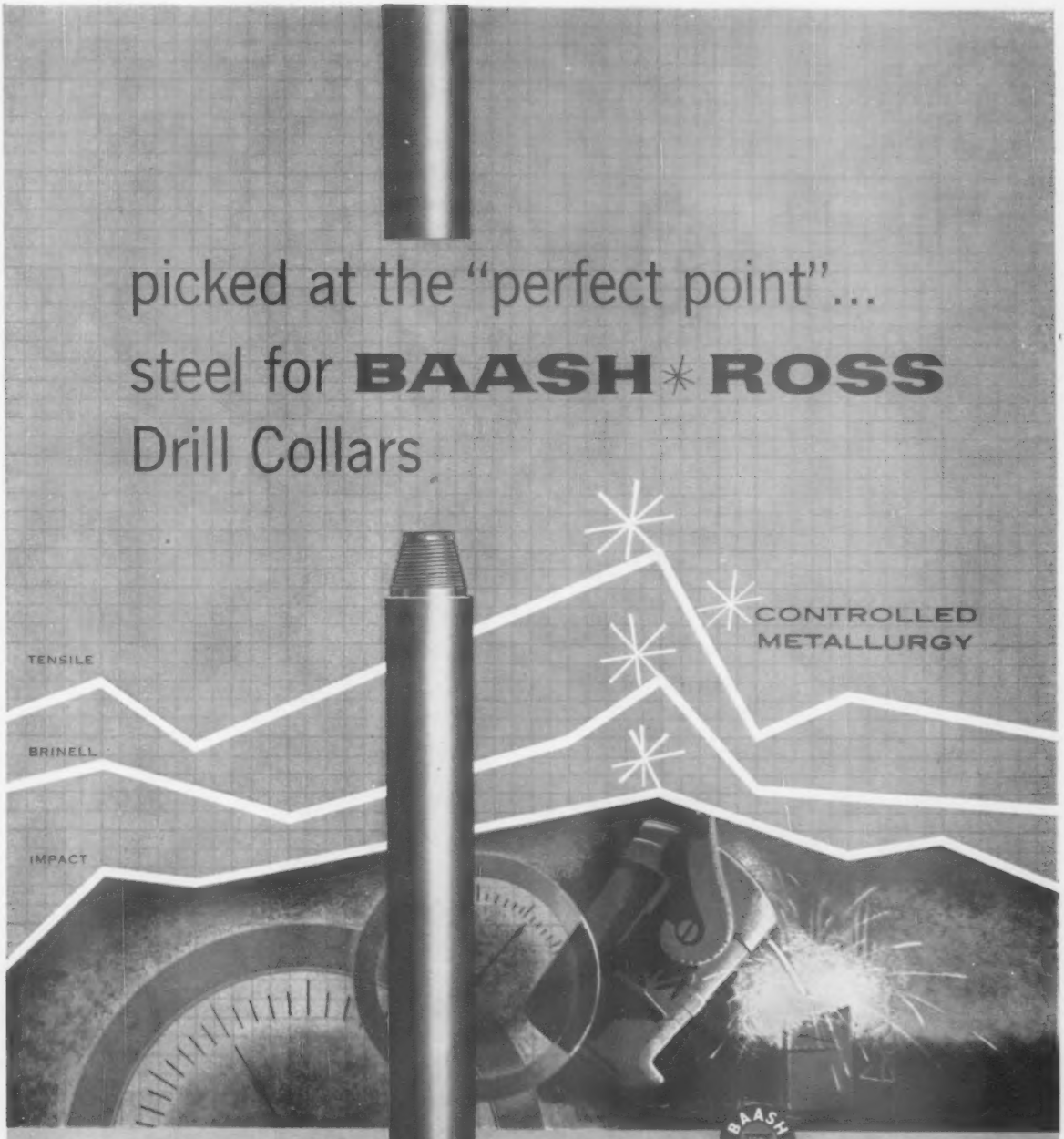

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and gas shows on three drill-stem tests in Pennsylvanian Strawn.

On test at 10,411-26 ft., open 4 hours, gas surfaced in 3 hours and 25 minutes, and recovery was 30 ft. of oil and gas-cut mud. Flowing pressure was zero.

At 10,426-76 ft., gas surfaced in 4 minutes, with a slight oil spray. Recovery was 60 ft. of oil and gas-cut mud, plus 90 ft. of free distillate.

On the last report, a test between 10,475-10,516 ft. recovered 680 ft. of fluid, being 50 per cent 58° distillate. Operators were coring ahead.

Location of the well is 20 miles southeast of Midland, and 4 miles southwest of the same operator's 1 Heidelberg, strawn gas-distillate discovery of Azalea field. Description of 1 Willis is NE NE Section 44, Block A, George C. Gray Survey.

Lease purchase in Garza County . . . Shell Oil Co. was reported to have taken a large block in southwestern Garza County on a 5-year lease. The land is on the J. B. Slaughter estate, and covers approximately 42,000 acres. Price was said to have been $17.50 an acre. Shell already had a geophysical option on the acreage.

Humble Oil & Refining Co. holds lease on 20 sections of Slaughter land, with expiration dates in April.

Paul C. Teas 1-A Slaughter, 5 miles southwest of Post, flowed 20 bbl. of oil an hour on a test of the Strawn.

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EAST TEXAS

Navarro Smackover Prospect Ready for Testing

The Texas Co. and Wheelock Oil Co. 1 Edgens, Smackover lime discovery southeast of Corsicana in Navarro County, was ready for production tests last week.

The well topped the lime at 8,701 ft. and recovered 75 ft. of 54° oil, 2,250 ft. of water cushion, plus 135 ft. of distillate-cut water cushion on a drill-stem test at 8,709-55 ft. Flowing pressure through ¼-in. chokes was 3,370 psi., and 4,170 psi. shut in.

Henderson County . . . Another Woodbine test has beeen set for the LaRue salt dome in Henderson County. W. C. Perryman and I. P. LaRue will drill their 1 W. W. Wofford on a 105-acre tract in Ralph Hunter Survey.

Location is on the south flank of the dome, and 3 miles south and slightly east of LaRue townsite. Cities Service Oil Co., Stanolind Oil & Gas Co., and American Petrofina are supporting the venture.

Another location on the dome has beeen made by C. L. Norsworthy, Jr., and E. B. LaRue, Jr., at 1 Mary Alice Wylie, on a 55-acre lease in the S. Boon Survey. Location is 2 miles north of LaRue townsite. It is scheduled to 4,800 ft.

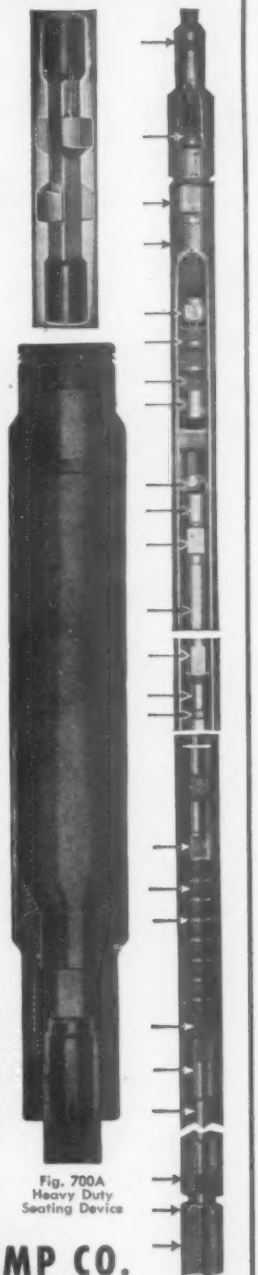
TEXAS GULF COAST

Lower Yegua Produces In Hordin County Discovery

Open-flow potential of W. P. Luse's lower Yegua discovery well 6½ miles southwest of Kountz, in Hardin County, is rated at 110,000,000 cu. ft. of gas per day. Completion of the well, 1 Kirkpatrick-Williams, opens an entirely new field, 3 miles from nearest other

THOMPSON

HEAVY DUTY Self-Aligning SAND SEALED-OFF PUMPS



Lower your lifting cost by using Thompson Sand Proof Self - Aligning Metal - to - Metal Pumps, or with our Combination Plunger and Cup Pumps. Equipped with Regular or Extra Long Alloy Plungers, ground individually to fit the barrels, assuring longer life on both pump and surface equipment.

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Inverted Combination Single or Double Plunger Self-Aligning Pumps can be equipped with a Sand Flush Valve which seals the Plunger off on top and cleans the barrel every pump stroke.

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Fig. 700A Heavy Duty Seating Device

Fig. 600-800-900

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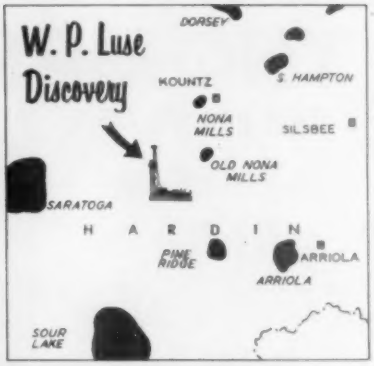


Portion of Hardin County showing location of W. P. Luse lower Yegua discovery well southwest of Kountz.

production. It will be known as West Yona Josa field.

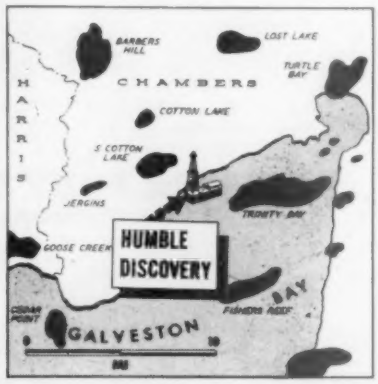
The well's lower Yegua pay is perforated at 9,477-92 ft. Hole was drilled to 9,635 ft. Gas sprayed a 48.6°-gravity condensate in the ratio of 57,400 cu. ft. of gas per barrel of liquid. Shut-in pressure is 4,205 ft.

Spot location is on a 640-acre lease in W. C. Railroad Survey 353.

Chambers County Wildcat Opens New Offshore Field

A wildcat at the northern edge of Trinity Bay (upper Galveston Bay) is productive of gas and condensate to open a new field about midway between South Cotton Lake and Trinity Bay fields.

It is Humble Oil & Refining Co. 1-K State-Galveston Bay. Location is just off Chambers County's southern shoreline, in Tract 14-E, South Cotton Lake field, on shore, is 2 miles northwest. Trinity Bay field is southeast in the bay. An 8,600-ft. dry hole, abandoned



Upper portion of Galveston and Trinity bays, in Chambers County, showing location of Humble Oil & Refining Co.'s newly completed offshore discovery well.

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Wisconsin Heavy-Duty Air-Cooled Engines are especially desirable for oil field service not only because of their heavy-duty operating dependability under all weather and climatic conditions, but also because of their light weight and compactness of the installation, extremely efficient AIR-COOLING at all temperatures from sub-zero to 140° F., and basic High Torque design that takes care of shock loads without quitting. Wisconsin-powered installations also represent savings in concrete, building materials, and installation time and labor.

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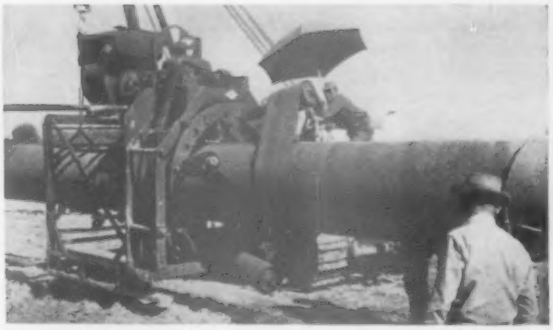
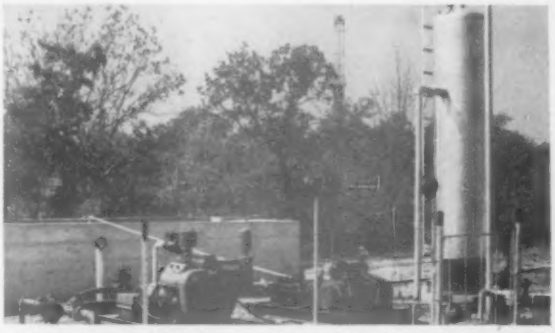
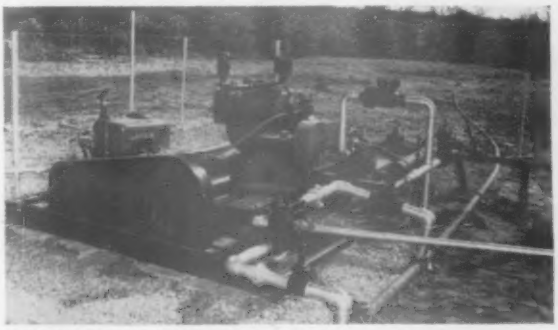


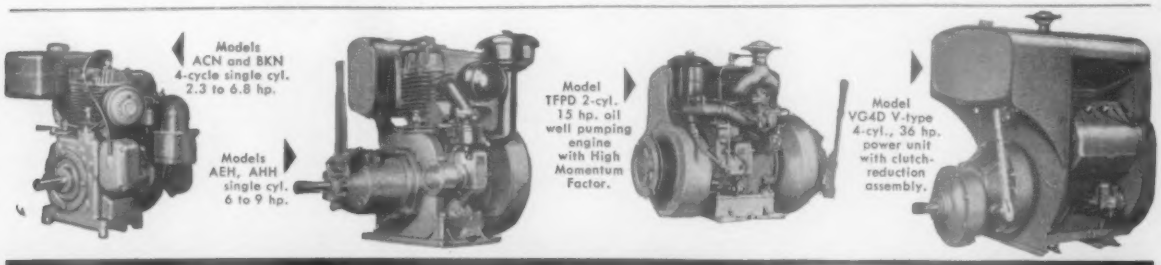
● Wisconsin-powered pipe-wrapping machine putting polyethylene tape and glass fibre wrap on 10-mile section of American-Louisiana's 30" line. (Plans also include tape application to 122 miles of 22" pipe). Photo courtesy Pipe Line Industry.



● Two skid-mounted Wisconsin-powered units, operating on a semi-developed oil lease in North Central Oklahoma . . . handling salt water disposal, separating gas and fluids (in the tall tank) and pumping finished oil to the marketing company's pipeline.



● Working on an Oklahoma oil lease, a Model TFD 2-cylinder Wisconsin engine (left), drives a specially-built Deming pump trimmed with special alloys for handling salt water; a Model VG4D (right) 4-cylinder engine with clutch, is belted to an H-35 Roper oil transfer pump, handling 28 BPH at 600 psi.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last September, is between it and Humble's new discovery well.

Production of Humble's well is from Vicksburg sand, perforated at 8,844-55 ft. Liquid (59.4°-gravity condensate) recovery during tests through 9/64-in. choke was at the rate of 17.6 bbl. per day. Gas volume was ungaged but ratio measured 37,725 cu. ft. per barrel flow was under pressure of 2,925 psi.

South Cotton field, discovered in 1937, is productive from Marginulina and Frio sands at 6,400 to 6,600 ft. Trinity Bay field, opened in 1950, produces from Frio sands at 7,600 to 8,300 ft.

NORTH TEXAS

More Tannehill Production Opened in Knox County

Bobby M. Burns 1 Lee, southwestern Knox County, is a new Tannehill sand producer, adding more interest to the current boom in that formation. The well flowed 120 bbl. of oil per day on 10/64-in. choke from perforations in the Tannehill at 2,296-2,301½ ft. Gravity is 38°.

This new Tannehill producer is located 2.2 miles northwest of Knox City, Tex., in Section 86, Block 2, D&W Survey. The field will be called Ley-Tannehill.

Bowar Field Gains Its Third Pay Sand

A third pay zone has been tapped at Bowar field, 8 miles southeast of Woodson in Stephens County. Warren Petroleum Corp. 3 Wade Boyd flowed 135 bbl. of oil per day on 14/64-in. choke from perforations in conglomerate at 4,139-53 ft.

Other producers in this area have Caddo or Mississippian lime oil. Location of the new-pay discovery is in A. C. McDonald Survey.

Wise County Conglomerate Discovery Gaged

Humble Oil & Refining Co. 1 Sealy-Smith Foundation is a new conglomerate oil discovery well in northwestern Wise County.

The well flowed 76 bbl. of 40.7°-gravity oil in 24 hours on 11/64-in. choke from perforations at 5,810-16 ft. This new pool is 5½ miles northwest of Park Springs, and 2 miles northwest of Younger pool. Location is Section 9, GH&H Survey.

Northwest Wise Gains Another Producer

More conglomerate production was opened in northwestern Wise County at Jack Grace Production Co. 1 J. C. Watson, 4 miles northwest of Chico.

The flowing discovery made 132 bbl. of oil per day on 12/64-in. choke, 43° gravity. Location is 2 miles east of production in the W. Watson Survey A-870. Flow was through perforations at 5,671-85 ft.

SOUTHWEST TEXAS

Live Oak County Gets New Hockley Discovery

Exeter Oil Co., Ltd., has another Hockley discovery in the general Dinero-Swinney Switch area, in southeastern Live Oak County.

Discovery well is the company's 1 Pugh, in the James McGloin Survey, which flowed 3 to 4 bbl. of oil per hour while testing through ¼-in. choke. Flow had pressure of 1,300 psi.

Pay zone is perforated at 4,165-67 ft. Total depth is 4,790 ft.

The area, 12 to 15 miles southeast of George West, has been marked by a succession of discoveries, both in

Hockley and Pettus sands, during the past year. Exeter's well is about 1½ miles north of Christi, Mitchell & Mitchell's East Dinero Hockley gas-discovery, and about the same distance east of Coastal State's Gas Producing Co.'s Freeman oil-discovery in Pettus sand.

Rhode Ranch Blowout Indicates New Deep Pay

A blowout in Atlantic Refining Co.'s deep exploratory test in the East Rhode Ranch area, in southeastern McMullen County, has given indication of another potentially productive Wilcox reservoir.

The well, 2 D. W. Rhode, blew out while circulating after a drilling break at 8,315 ft. in Wilcox sand. The resulting fire destroyed the derrick and the rig owned by Richardson & Stewart, drilling contractors on the well.

Crews of M. M. Kinley, of Houston, cleared the wreckage and extinguished the fire readily, but, as this is written, the well still is blowing out of control.

The sand is the deepest so far drilled in the area. Previous production has been from multiple horizons ranging from the relatively shallow Cole (Jackson) sand about 1,750 ft. to a 7,600-ft. Wilcox sand.

Successful Wildcats

ARKANSAS

Lafayette County: Don D. Montgomery 1 Ford, C NW NW 35-16s-24w. 2⅛ miles SE of Lewisville. IPF 237 BOPD, 6/64-in. choke, 41.5°. Smackover perfs. 8,305-12 ft. TD 8,360 ft. (Discovery well of Kress City field.)

CALIFORNIA

Fresno County: Occidental Petroleum Corp., 62A-7 Burrel, NW NE 7-17s-19e, 159 BOPD, 31° gravity, 5 per cent cut, 10/64-in. choke, perfs. 6,491-6,529 ft., TD 7,105 ft. (New pool discovery in Burrel-SE field.)

LOUISIANA GULF COAST

Iberia Parish: Olin Gas Transmission Corp. 1 Compton, 71-12s-7e (west flank Iberia salt dome). Shutin gas well, no gage, perfs. 9,964-70 ft. and 9,974-84 ft. TD 10,552 ft. (New pay in Iberia field.)

Richardson & Bass 1 Stanolind-Tidewater-LeBlanc, 41-12s-5e (north flank of Jefferson Island dome). IP 66 BCPD and 2,555 M.c.f. daily, ⅛-in., 56.2°, perfs. 12,956-66 ft. TD 16,015 ft. (New pay and extension in Jefferson Island field.)

Lafourche Parish: Sinclair Oil & Gas Co. 1-A OCS 0605, Blk 86, South Timbalier area, Gulf of Mexico. IP 336 BOPD, ⅜-in., 35.8°, GOR 1,100 cu. ft. per barrel, perfs. 12,167-83 ft. TD 12,250 ft. (New offshore field.)

Plaquemines Parish: Tidewater Oil Co. 1 Gilmore, 16-21s-28e. IP 240 BOPD, ⅛-in., 30.5°, GOR 710 cu. ft. per barrel, perfs. 13,814-16 ft. and 13,818-20 ft. TD 15,215 ft. (New pay and extension in West Bastian Bay area.)

Terrebonne Parish: Union Oil Co. of California and Louisiana Land & Exploration Co. 1 State Lease 2826, Timbalier Bay (2 miles east of Caillou Island field). IP 325 BOPD, 5/32-in., 34.2°, GOR 846 cu. ft. per barrel, perfs. 11,834-44 ft., and (dual completion) 160 BOPD, 5/32-in., 35°, GOR 1,330 cu. ft. per barrel, perfs. 11,938-48 ft. TD 15,015 ft. (Extends Caillou Island field.)

NORTHWEST NEW MEXICO

San Juan County: Benson-Montin-Greer Drilling Co. 1 Foster, C NE SW 21-26n-13w. IPP 60 BOPD, Gallup discovery, new field. TD 5,162 ft. Gallup.

Rio Arriba County: Southern Union Gas Co. 6 Jicarilla "E," SE NW NE 21-26n-4w. IP 5,663 M.c.f. of gas per day, Tocito discovery, new pay. TD 8,023 ft. Morrison.

SOUTHEAST NEW MEXICO

Chaves County: Charles P. Miller 1 S. M. State, NE NW 20-4s-17e, 20 miles NW Kenna. IP, open flow, 1,852 M.c.f. gas, plus 12 bbl. distillate, Pennsylvanian 6,314-82 ft. TD 6,786 ft. Elev. 3,902 ft., Pennsylvanian 5,755 ft., Mississippian 6,440 ft., Silurian 6,635 ft., pre-Cambrian 6,660 ft.

NORTH DAKOTA

Billings County: Northern Pump Co. 1 Lucy Fritz, C SE SE 15-137n 100w. IPF 1,224

BO on 7-hour test on 24/64-in. choke. Heath discovery, new field. TD 8,148 ft. Fryburg.

SOUTHWEST TEXAS

Atascosa County: Lone Star Producing Co. 1-B Urbanczyk, F. M. Hunt Sur. 149, A-397 (4 miles northwest of Fashing). IP (6-hour test) 5,558 M.c.f. daily, ¾-in., 23.75 BC per 1,000 M.c.f., perfs. 10,790-10,816 ft. (Edwards lime). TD 10,921 ft. (New deep Edwards field.)

McMullen County: Amerada Petroleum Corp. 1 Horton, James M. Jean Sur. 29, A-281. Shut in gas well, no potential gage, perfs. 11,520-85 ft. (Edwards lime). TD 11,854 ft. (Extends and confirms unnamed deep Edwards discovery 5½ miles southeast of Tilden by Producers Corp.).

Starr County: Claud B. Hamill et al 1 Bentsen Brothers, Sec. 6, Newman El Benadito Grant. IP 2,000 M.c.f. daily, open-flow potential, dry gas, perfs. 5,811-17 ft. TD 8,515 ft. (New field.)

TEXAS GULF COAST

Goliad County: Sun Oil Co. 1 Berger; T. W. Ward Sur., A-300. IP 3,750 M.c.f. daily, open-flow potential, dry gas, perfs. 3,156-68 ft. (Frio). TD 4,201 ft. (New pay and extension in Schroeder area.)

Kenedy County: Humble Oil & Refining Co. 17 Armstrong, "Barreta" Jose Francisco Balli Grant. IP 1,420 M.c.f. daily, open-flow potential, dry gas, perfs. 9,013-23 ft. TD 10,503 ft. (New pay in Barreta field.)

WEST TEXAS

Crockett County: LeMay Oil Co. 1 Blair, 50-1-I&GN, 12 miles NE Sheffield. IP 52 BOPD, ¾-in., CP 50 psi., GOR 120, 32°, pay 1,606-26 ft. TD 1,662 ft.

Kimble County: L. D. Jetton 1 Jetton, Edwin Quimby Sur. 371, 3 miles S Junction. IP calculated 50,000 cu. ft. gas, pay 402-15 TD 415 ft.

Reeves County: American Trading & Production Corp. 1 Hubbard estate, 32-57-T1-T&P, 2 miles NW Red Bluff. IP 7 BOPD, ½-in., 38°, GOR 11,390:1, Delaware sand pay 2,761 ft. TD 2,890 ft.

Runnels County: G. W. Strake 1 Mitchell, Blk. 64, H&TC Sur. 99, 5 miles SE Wingate. IP 106 BOPD, 48/64-in., TP 60 psi., GOR 1220, 44°, Fry sand perforations 4,328-38 ft. TD 5,024 ft.

Upton County: Gulf Oil Corp. 1 McElroy Ranch "F," 17-42-T5S-T&P, 10 miles NE Crane. IP 311 BOPD, 16/64-in., TP 650 psi., GOR 643, 41, Pennsylvanian 9,450-9,500 ft. TD 12,679 ft., PB 9,600 ft.

NORTH TEXAS

Archer County: A. D. Peters and C. H. Clarida 2 Peters, I&GN Sur., A-692, 15 miles NE Olney. IPP 38 BOPD, 38°, pay 779 ft. TD 781 ft.

Clay County: Shell Oil Co. 30 Scaling, Sec. 15, H. Williams Sur., A-704, 1 mile SW Joy. New pay in Joy field. IPP 76 BOPD, 40°, Palo Pinto 2,584-92 ft. TD 2,700 ft.

Grayson County: Nortex Oil & Gas Corp. 1 Irvin Scarbrough Unit, E. Couch Sur., A-279, 6 miles N Whitesboro. New pay in Sandusky, West field. IPP 42 BOPD, 41°, GOR 650, Strawn 6,130-40 ft. TD 6,511 ft.

Jack County: Paul Steed, Jr. 1 Myers, M. J. Howard Sur., A-1623, 7 miles NW Jacksboro. IPP 148 BOPD, 38°, GOR 300, Buttram sand 2,777 ft. TD 2,783 ft.

Montague County: P-M Drilling Co. 1-A Yarbrough, J. B. Miller Sur., A-460, 4½ miles SW St. Jo. IP 106 BOPD, 13/64-in., TP 95 psi., 42°, GOR 455, Strawn perfs. 4,606-19 ft. TD 7,054 ft. New pay in Dyemound, South field.

Wilbarger County: The Texas Co. 1-W Waggoner, 18-4-H&TC, 17 miles SE Vernon. IP 258 BOPD, 20/64-in., TP 25 psi., 38°, GOR 735, Strawn 3,698-3,716 ft. TD 4,183 ft. Suggested field name, Grayback, SE (Strawn lime.)

Young County: Cox & Campbell 1 Vogtsberger, TE&L Sur. 239, A-486, 1 mile NE Olney. IPP 24 BOPD, 38°, pay 1,021 ft. TD 1,027 ft.

WEST CENTRAL TEXAS

Jones County: So-Lo Tex Petroleum Corp. 1 Winter, D. T. Bruce Sur. 135, 9 miles NW Abilene. Re-completed as Tannehill discovery. TD 2,410 ft., pay 2,066 ft., IPP 77 BOPD, 40°, GOR 364.

Shackelford County: Geochemical Surveys, Inc. 1 Edgar Davis, 79-13-T&P, 7 miles NE Abilene. IPP 25½ BOPD, 40°, GOR 200, Hope sand 1,909-13 ft. TD 2,395 ft.

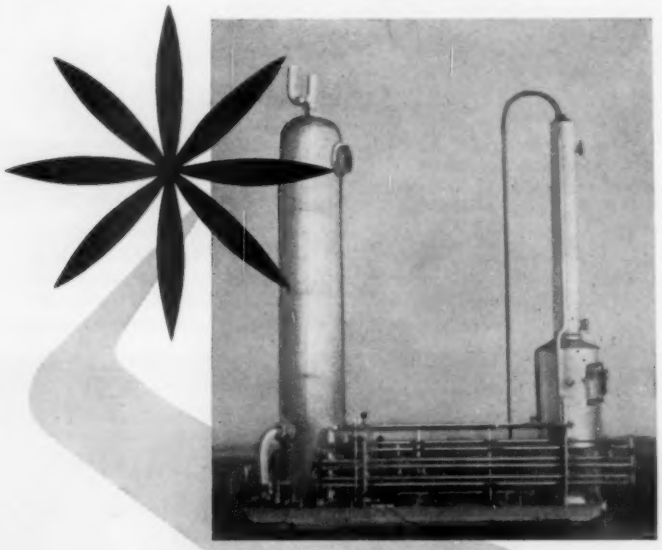
Fisher County: Good Earth Oil & Gas Co. 1 Kenner, 37-2-H&TC, 6 miles NW Roby. IP 1,104 BOPD, 32/64-in., TP 320 psi., GOR 1008, 40°, Lower Canyon sand perfs 5,256-66 ft. TD 6,150 ft. Elev. 2,003 ft.

Shackelford County: Low Drilling Co. 1-A Davis, 14-12-T&P, 7 miles W Albany. IPP 75 BOPD, 38°, GOR 400, Cook sand 1,395-1,401 ft. TD 5,077 ft.

Taylor County: Duffield Oil Co. 1 Hinds, CEP&IMFG Sur., 2 miles SE Tye. IPP 96 BOPD, 37°, GOR 150, Saddle Creek 2,121-17 ft. TD 2,507 ft.

UTAH

San Juan County: Gulf Oil Corp. 1 Desert Creek-Navajo, C NE NE 1-41s-22e. IPF 263 BOPD, 12/64-in. choke, Hermosa discovery, new field. TD 5,858 ft. Navajo.



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This double cone drilling bit is particularly adaptable to extremely hard formations. Crown and waterway design provide maximum cleaning efficiency giving high penetration and long life. There is a Christensen bit design matched to your formation.

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CHRISTENSEN DIAMOND PRODUCTS

Performance Report

No. N-2048

Diamond Drilling Bit reduced cost per foot by 69% and saved 6 full days drilling time in hard shale and sandstone!

BIT DATA:

Description—Double Cone Drilling Bit
Size—6⅜″
Carat Weight—350.10 cts.
Net Bit Cost—$786.45
Diamonds—Large

Location:

Candelaria Field, Kennedy County, Texas.

Formation:

Vicksburg

Photo shows appearance of bit on return for salvage.

Performance:

In hard shale and sandstone of the Tertiary Period known as the Vicksburg Formation, this bit cut a total of 1404 feet in 220 hours. Run from 12,096 feet to 13,500 feet, this bit did the work of approximately 18 conventional bits. It saved the operator 18 round trips of at least 8 hours each, or SIX FULL DAYS. The average penetration rate was 6.38 feet per hour. Estimated cost per foot of conventional bits, up to $1.82. This diamond drilling bit was in excellent condition after use and gave over 80% diamond recovery for a cost per foot of only $0.56.

Operating Conditions:

Bit Load—8000 to 10,000 lbs., Rotary Table Speed—80 to 90 R.P.M. Fluid Volume 165 to 175 G.P.M.

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CHRISTENSEN DIAMOND PRODUCTS

1937 SOUTH SECOND WEST • SALT LAKE CITY, UTAH

WOGA's new president is bent on . . .

. . . Making Peace in California

S. F. BOWLBY, vice president of Shell Oil Co. in charge of West Coast production and exploration activities, might possibly become the Dag Hammarskjold of the California oil industry.

He is quick to size up his recent election to the presidency of the Western Oil and Gas Association as a mandate to become peacemaker for the state's badly split oil business.

"Now more than anything else we need to restore harmony to our industry which was torn apart by the bitter Proposition Four fight," Bowlby says. "We need to close the ranks and recognize our common problems and begin working together again."

While the role of peacemaker may be new to him, Bowlby has a long and distinguished record of constructive service to both the industry and community.

S. F. BOWLBY
. . . the thing to do is restore harmony.

Science for youth . . . Typical of this service are two of his current projects, the sixth annual Southern California Science Fair and the 1957 National Science Fair, both of which will be held this spring in Los Angeles. Bowlby is chairman of both.

These fairs are designed to promote interest in science education by giving recognition to science students. Junior and senior high school youth display their projects to parents, teachers, other students, and the general public.

In these days of intense competition for the services of young scientists, the oil industry has a strong spokesman in Bowlby.

In addition to his personal work in the field of attracting students to science careers, his company has an outstanding record with its Shell Merit Fellowship Awards. These awards are given to deserving high school science and mathematics teachers enabling them to take special summer refresher courses at Stanford and Cornell universities.

Bowlby's interest in things scientific extends beyond his Shell working hours. He is a hi-fi purist (builds his own from the ground up) and is a licensed radio "ham".

Straightening crooked holes . . . Following his graduation in 1926 from the Wisconsin Institute of Technology, Bowlby began his oil industry career that summer as a roustabout for Roxanna Petroleum Corp. during the Borger boom in the Texas Panhandle. He then went back to school for a petroleum engineering degree from the University of Oklahoma.

After leaving O.U. he returned to the Panhandle as a roustabout again and had worked his way up to tool dresser before getting his first engineering assignment.

This assignment took him to Marshall, Okla., where he was put to work trying to figure out why Shell's newly drilled deep-rotary holes were not straight. During these investigations, Bowlby did important work on rotary mud and techniques for measuring drilling well inclinations.

Following various engineering assignments and a return to operations on a 12-hour-tour basis during the depression, Bowlby resumed his engineering career in 1933. A special assignment took him to Europe in 1935. On returning to the U. S., he became chief exploitation engineer in Houston and then division manager for Shell in southern Louisiana.

His first California assignment came in 1940 when he was named chief exploitation engineer in Shell's Los Angeles office. He later headed the Los Angeles Basin and San Joaquin divisions. In 1946 he was made vice president in charge of exploration and production for Shell's western operations. In 1954 he became Shell's senior officer on the West Coast.

Personals

K. G. Smith, district foreman with Interstate Oil Pipe Line Co. in Heidelberg, Miss., has been promoted to superintendent in Magnolia, Ark.

Joe N. Gifford, junior geologist with Sinclair Oil & Gas Co. in Tulsa, has been transferred to Wichita.

George J. Abraham, engineering trainee with Atlantic Refining Co., has been transferred to Merryville, La., from Greggton, Tex.

Robert Q. Sharpe, staff engineer of the industrial division, lubricating department, in Socony Mobil Oil Co.'s New York office, has been appointed chief engineer of the department.

Sam Cobb, pipeline superintendent for Col-Tex Refining Co. in Colorado City, Tex., has joined Anderson-Prichard Pipe Line Corp. as engineer in Cyril, Okla.

Howard Ritzma, formerly district geologist for Southern California Petroleum Corp. in Denver, has opened consulting offices there.

Tony Gibbons, eastern division geological representative for Carter Oil Co. in Tulsa, has been named area geologist in Durango, Colo. **R. E. Johnson** will succeed Gibbons in Tulsa.

Richard H. Travis has joined David G. Reynolds, Process Unit Designs, as chief instrument engineer. He will specialize in application of electronic instrumentation, data logging, and process analyzers to new and existing process units.

James N. White, supervisor of compressor-station construction for Texas Gas Transmission Corp., has been named assistant superintendent of design engineering. **Gerald A. Suddoth,** senior engineer, will succeed White as supervisor of compressor-station construction. **James O. King,** senior engineer, has been promoted to senior staff engineer.

N. B. Latham, general foreman in Houdry Process Corp.'s manufacturing department, chemicals division in Paulsboro, N. J., has been appointed superintendent of the services section. **H. G. Vernon,** mechanical engineering section designer in the engineering development section, Paulsboro, has been named plant mechanical engineer. **D. E. Field,** technical assistant to the plant manager, has been appointed plant development engineer. **W. R. Graves,** formerly shift foreman in the production section, has been named production foreman. **C. A. Bratton, Jr.,** will succeed Graves as shift foreman.

New Drilling Association Elects

Officers of the Association of Oilwell Servicing Contractors were elected at the first annual meeting in Fort Worth last week. Left to right are Chester Taggart, Taggart Well Servicing Co., Grand Falls, Tex., second vice president; Frank Bateman, Bateman & Whitsitt, Inc., Hobbs, N. M., first vice president; J. C. Williamson, Williamson Well Servicing Co., Odessa, president; and Jimmy Wilkins, Permian Servicing Co., Inc., Odessa, treasurer.

S. Y. Wong has joined Continental Oil Co. in Ponca City, Okla., as technical assistant to the director of petrochemical research division, development and research department.

Francis O'H. Searle and **Cecil R. Buckles** have been appointed assistant general attorneys for Sinclair Oil & Gas Co. Searle joined Sinclair in 1926. Buckles was with the Prairie companies in Independence, Kans., before their merger with Sinclair in 1932.

Paul G. Carpenter, formerly with Phillips Petroleum Co., has been named director of research and development for Copolymer Rubber & Chemical Corp. at Baton Rouge, La. **Ross Van Volkenburgh** has been named a supervisor in the research division.

Frank Richardson, assistant to the vice president in charge of production and exploration for Lion Oil Co., has been appointed manager of the production and exploration department. **Robert I. Williams,** manager of the company's Rocky Mountain region, has been named assistant manager of the department and transferred to El Dorado, Ark., from Denver. **Eugene L. Maxwell,** manager of the central region in Wichita, Kans., will transfer to Denver to succeed Williams as Rocky Mountain manager. **Robert P. Evans,** assistant manager of the southwestern region in Midland, Tex., will replace Maxwell as manager in Wichita.

Eugene Holman, board chairman of Standard Oil Co. (N. J.), has been reelected chairman of the Commerce Department business advisory council for 1957. **S. D. Bechtel,** president of Bechtel Corp., has been reelected vice chairman.

Everett F. Wells, executive vice president of Ashland Oil & Refining Co. for the last 6 years, has been elected president. Wells succeeds **Rexford G. Blazer,** who has been named chairman of the board. Rexford Blazer will replace **Paul G. Blazer,** who has been elected chairman of the company's executive and finance committees.

L. G. (Gayle) Rodgers, manager of Sunray Mid-Continent Oil Co.'s gasoline division, production department, has been named refining technologist with the Department of Interior's Office of Oil and Gas. He will be on loan to the Government from Sunray Mid-Continent for 1 year. Rodgers replaces **John H. Lovett,** who was on loan from Standard Oil Co. (Ind.).

R. T. (Tom) Neville, superintendent of Texas Gas Corp.'s Winnie, Tex., plant, has been named general superintendent of all plant operations for the company. Neville joined Texas Gas in 1945. **Charles C. Albritton,** superintendent of operations at the Winnie plant, has been promoted to assistant general superintendent there. Albritton has been with the company since 1945.

Personals

Arthur J. Helmbrecht, vice president of Buckeye Pipe Line Co., has been elected a director.

E. S. Winham, engineer with Standard Oil Co. of Texas in Houston, has joined G. & W. Drilling Co., Inc., in Abilene, Tex., as vice president.

Ralph E. Mullin, vice president of Lotus Oil Co., Kansas City, has been elected president of Westpan Hydrocarbon Co., Kansas City.

George E. Caraway, Jr., plant superintendent in Merryville, La., for Atlantic Refining Co., has been named regional gas supervisor and plant superintendent in Lafayette, La.

E. E. Tucker, assistant division production manager of Tidewater Oil Co.'s southern division, has been promoted to division production manager. Tucker replaces the late D. E. Legan. Tucker has been with Tidewater since 1940.

W. E. Haggard, manager of Continental Oil Co.'s southern region land department, Houston, has been promoted to manager of operations of the company's western region, Los Angeles.

H. W. McNeil and **Ralph Fillmore** have formed a partnership as independent operators in Oklahoma City. McNeil was formerly with Harper-Turner Oil Co. Fillmore was with Anderson-Prichard Oil Corp.

Hugh B. Hodges, retired Tulsa drilling contractor and independent producer, has been elected a director of Sunray Mid-Continent Oil Co. Hodges was president of H. & S. Drilling Co. before he retired in 1953. Hodges succeeds **James K. Ellis,** San Antonio, who has been named a director of Suntide Refining Co., Corpus Christi, Tex., affiliate of Sunray.

Dr. Michael J. Rzasa has been appointed manager of Cities Service Research & Development Co.'s new product research laboratory at Cranbury, N. J. **B. H. Rosen** has been transferred from New York to Cranbury where he will be in charge of product development at the laboratory. **Don Milsom** has been transferred from the company's Lake Charles, La., laboratory to head radiation research at Cranbury. In other appointments, **Fred Merliss** has been named assistant manager of the company's Tulsa exploration and production laboratory.

Personals

Howard H. Hinson, administrative vice president of Continental Oil Co., has been promoted to vice president and general manager of the company's reorganized and expanded foreign department. **James S. Royds,** assistant manager of the foreign department, has been named general manager of the

H. H. HINSON

JAMES S. ROYDS

exploration department. In other promotions **S. K. Clark** has been named assistant to the vice president and general manager of the foreign department. **W. E. Haggard,** manager of headquarters land section, has been appointed western region operations manager at Los Angeles. **W. C. Stout,** assistant manager of the land section, will succeed Haggard as manager.

Dwight A. Dougherty has been named general manager of SD Plants, Inc., subsidiary of Scientific Design Co. Dougherty was formerly manager of Canadian and Latin American operations for M. W. Kellogg Co.

A. T. Guernsey, evaluation and senior exploitation engineer in Shell Oil Co.'s New York office, has been appointed head of the new special evaluation office in Shell's Denver production department.

Cary M. Maguire, general manager of Russell Maguire oil operations, has announced that headquarters of the organization will be moved to Dallas from Wichita Falls, Tex. Maguire will move to Dallas along with **Lyman C. Dennis,** chief geologist; **Robert B. Davis,** assistant geologist; **George L. Duggan,** engineer; **Dwight M. Murray,** landman; and **Harry E. Crooks,** purchasing agent.

George T. Goggin, executive vice president of Douglas Oil Co., has been elected president of the newly organized California Independent Oil Institute. Other officers are **Lloyd L. Aubert,** vice president, Bankline Oil Co., president; **Richard K. Jamison,** secretary-treasurer, Harbor Refining Co., president. Purpose of the group, according to Goggin, is to show that the independent oil industry helps keep gasoline prices realistic through competition and is a vital factor in maintaining a healthy state economy.

Richard J. McGillivray has been named group leader in the Whiting, Ind., research department of Standard Oil Co. (Ind.).

John D. Lung, production engineer with Continental Oil Co. in Ventura, Calif., has been promoted to senior production engineer and transferred to Houston.

Richard D. Hart, formerly petroleum inspector with the United States Navy at Bahrain Island in the Persian Gulf, has joined Amerada Petroleum Corp. as geologist in Oklahoma City.

R. T. Leeper, formerly head of the oil division of United States National Bank at Denver, has joined L. C. Smith-erman Drilling Co. as general manager and Wichita representative.

William H. Harwood, research chemist for Continental Oil Co. in Ponca City, Okla., has been promoted to senior research chemist in the central research division, development and research department.

Hugh Miller, Houston, consultant and former president of Corpus Christi Refining Co., has joined Kerr-McGee Industries, Inc., as manager of the company's Wynnewood, Okla., refinery. Miller was general superintendent of refineries with Phillips Petroleum Co. for many years.

R. E. Dumas Milner, Jackson, Miss., business man; **Harold R. White,** Jackson consulting geologist, and **Julian Alexander,** Jackson attorney, have formed Milner-White Oil Co. with headquarters in Jackson. The company plans operations in Mississippi and the southeastern states.

Delton Marcum, drilling superintendent with Marcum Drilling Co., has transferred to Midland, Tex., from Colorado City, Tex.

John H. Melvin, Ohio state geologist, has been elected vice president in charge of operations for Pennsylvania Drilling Co., Pittsburgh.

Clay H. Miller, Jr., geologist with Socony Mobil Oil Co. in Caracas, Venezuela, has joined Conorada Petroleum Corp. as research geologist in New York.

Joe W. Caldwell has been appointed district manager of North Texas oil operations for Ambassador Oil Corp. in Jacksboro, Tex. Caldwell was formerly production manager of Bay-Tex Oil Co., Dallas, and before that with Great Lakes Carbon Corp. and Stanolind Oil & Gas Co.

Dr. Willard M. Dow, director of research for Texas Gas Corp., and **A. A. White,** secretary and general counsel, have been elected vice presidents of the company. Dow will be vice president in charge of manufacturing, engineering, and research. **A. Carl Gladden,** vice president of the company, has been elected a director.

Nelson D. Griswold, director of Dow Chemical Co. and Texas division assistant general manager in charge of engineering and utilities, has been appointed chairman of a newly appointed divisional executive board. **J. T. Faubion,** manager of production coordination, has been appointed chairman of the divisional operating board.

DEATHS

Joseph E. Fleming, 79, Titusville, Pa., retired independent oil man, died January 15 in Titusville. Fleming's career in the oil industry covered 60 years. He was at one time one of the largest producers in the western Pennsylvania area.

Walter L. Goldston, president of Goldston Oil Corp., Houston, died January 22 in Houston.

Mixson Kincannon, 43, plant manager at Winnie, Tex., for Texas Gas Corp., died recently of a heart attack.

Charles B. Peters, 79, pioneer Oklahoma oil man, died January 18 in Tulsa. Peters was chairman of Norbla Oil Co. and founder of the old Peters Petroleum Co.

George R. Marland, 59, Tulsa independent oil lease and royalties broker and adopted son of the late E. W. Marland, Ponca City, Okla., oil man and former governor of the state, died January 18 in Tulsa after a heart attack.

Herman H. Graff, 77, early-day Montana driller and founder of Montasota Oil & Development Co. at Big Timber, Mont., died recently in Seattle of a heart ailment.

Everett Guy Miller, 78, retired oil producer, died January 12 in Bakersfield, Calif.

BP GOES TO ANTARCTICA

THE TRANS-ANTARCTIC Expedition is being supplied with petroleum fuels and lubricants exclusively by The British Petroleum Company.

Sir Edmund Hillary, leader of the New Zealand Party, is here seen driving a tractor, while his second-in-command, Mr. Bob Miller, supervises the unloading of aircraft fuel at the stores dump near Shackleton Base.

The British Petroleum Company is proud of its association with the Expedition—a tribute to the high quality of all products marketed under the BP Shield throughout the world.

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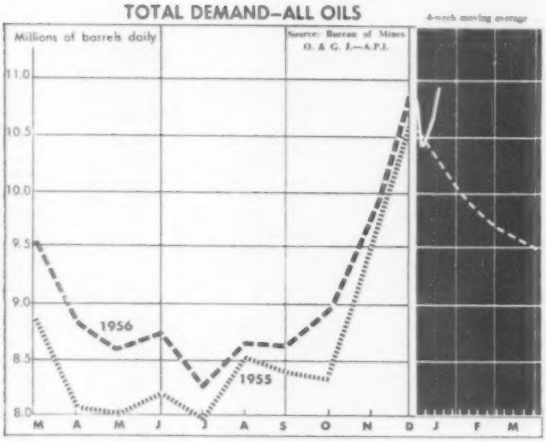
Latest Figures . . . Industry Trends

A QUICK LOOK AT THE HIGHLIGHTS

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	7,436,675	UP	52,000	UP	213,888
Crude stocks	259,657,000	DOWN	326,000	UP	469,000
Completions	1,082	UP	189	DOWN	100
Refinery runs	8,120,000	DOWN	152,000	UP	168,000
Gasoline stocks	191,373,000	UP	2,130,000	UP	15,588,000
Kerosine stocks	27,542,000	DOWN	2,253,000	UP	4,831,000
Distillate stocks	114,424,000	DOWN	8,559,000	UP	19,814,000
Residual stocks	41,009,000	DOWN	1,718,000	UP	1,997,000
Four-product stocks	374,348,000	DOWN	10,400,000	UP	42,230,000
Total imports	1,028,900	DOWN	654,000	DOWN	237,600

TOTAL DEMAND—ALL OILS



Abnormal Stock Shifts Can't Be Charged Entirely to Suez Crisis

REDUCTIONS in major-product inventories on the East Coast for the 9-week period from November 2 to January 4 accounted for 60.6 per cent of withdrawals for the entire country.

Even gasoline stocks decreased on the East Coast. Total gasoline stocks for the country increased 14.5 million barrels in the 9-week period, but stocks on the East Coast were down a quarter of a million barrels.

District 2 ran more gasoline to storage in the 9-week period than all of the other districts combined. Gasoline stocks amounted to 52,825,000 bbl. on November 2 and had climbed 7,797,000 bbl. to 60,622,000 bbl. on January 4.

District 1 accounted for almost 38 per cent of the over-all reduction in stocks of middle distillates. This cut in stocks on the East Coast was possible since inventory accumulations had been abnormal earlier in the year. Despite the reductions in November and December, middle-distillate stocks in District 1 on January 4 topped the volume reported for January 1, 1956, by 13,853,000 bbl. This gain was very close to the increase reported for District 2 where additions for the year amounted to 13,022,000 bbl.

Middle-distillate stocks on the Gulf Coast on January 4 represented a reduction from the total on hand at the first of 1956. Part of the Gulf Coast reduction for the year was due to increased shipments to Europe after the closing of the Suez Canal.

The table at the bottom of the page shows that there was very little increase in Gulf-East Coast shipments of fuels during November and December compared with the same months in 1955. Most of the increase in liftings to District 1 was due to additional shipments of crude to replace some of the Middle East crude, cut off by the closing of the canal.

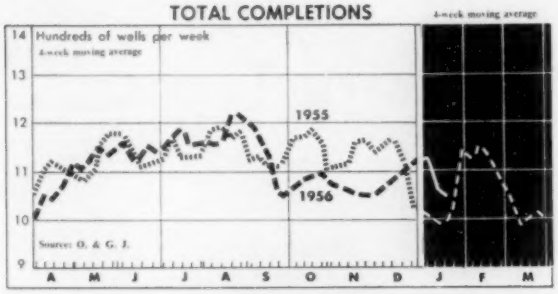
Market reports in the Mid-Continent call attention to the movement of about half a million barrels of distillate out of the area to the Gulf Coast for shipment, probably export.

Reports by the Office of Oil and Gas show shipments of middle distillate to Europe averaging 99,000 bbl. daily in November and 129,000 bbl. daily in December.

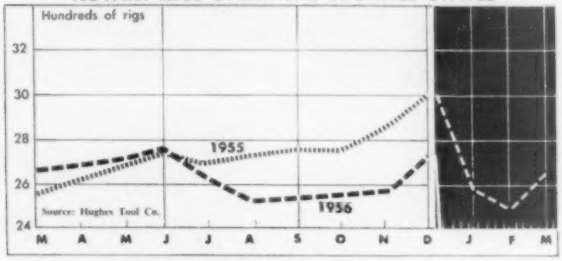
GULF-EAST COAST TANKER SHIPMENTS
(Thousands of barrels daily)

	Crude	Gasoline	Middle distillate	Other products	Total
1955—					
September	419	600	487	194	1,700
October	430	602	522	195	1,749
November	408	587	586	189	1,770
December	439	541	760	220	1,960
1956—					
January	465	502	952	235	2,154
February	511	565	904	244	2,224
March	466	654	635	232	1,987
April	401	604	546	178	1,729
May	352	681	492	227	1,752
June	388	637	511	207	1,743
July	411	649	554	179	1,793
August	455	660	581	192	1,888
September	434	599	563	181	1,777
October	430	577	656	199	1,862
November	512	604	609	217	1,942
December	599	594	737	188	2,118

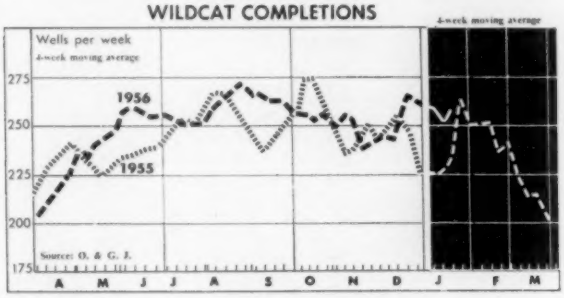
TOTAL COMPLETIONS



ROTARY RIGS OPERATING IN UNITED STATES



WILDCAT COMPLETIONS



ACTIVE ROTARY RIGS*

Area—	1-21-57	1-14-57	1-23-56
North Central and East	80	80	95
Southeast	36	32	45
Okla., Kans., Ark., Mo.	395	418	474
Louisiana	443	431	424
North and East Texas-Panhandle	362	370	417
Gulf and South Texas	249	239	269
West Texas-New Mexico	446	462	476
Rocky Mountain	197	193	227
Pacific Coast	105	105	130
Total United States	2,313	2,330	2,557
Western Canada	229	226	222

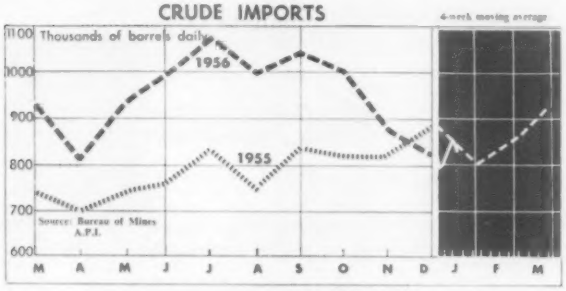
*Hughes Tool Co.

WEEKLY WELL COMPLETIONS . . . WEEK ENDED JANUARY 19, 1957

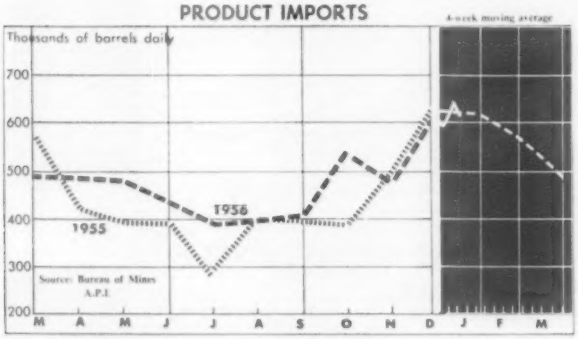
	Total of all wells					Cum.		Wildcat completions and discoveries					Cumulative total, 1957				
	Comp.	Oil	Gas	Dry	Footage	1957	1956	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
Ala.-Ga.-Fla.	*1	0	0	1	3,022	1	6	0	0	0	1	1	0	0	0	1	1
Arkansas	27	23	0	4	71,740	61	42	1	0	0	1	2	1	0	0	7	8
California	37	26	1	10	182,881	124	118	1	0	0	10	11	2	0	0	36	38
Colorado	23	4	2	17	106,253	88	70	2	0	0	15	17	3	0	1	56	60
Illinois	57	19	0	38	142,588	118	273	0	0	0	17	17	0	0	0	34	34
Indiana	17	6	1	10	31,691	39	36	0	0	0	2	2	3	0	0	6	9
Kansas	62	25	1	†36	218,477	228	255	0	0	0	14	14	7	0	0	40	47
Kentucky	49	22	2	25	76,975	86	121	2	0	1	11	14	5	0	1	15	21
Louisiana	72	33	5	34	661,158	190	291	3	2	1	11	17	5	2	3	22	32
North	12	6	3	3	45,099	83	126	0	0	0	0	0	0	0	1	7	8
South	47	17	2	28	498,846	85	138	2	2	1	11	16	4	2	2	15	23
Offshore	13	10	0	3	117,213	22	27	1	0	0	0	1	1	0	0	0	1
Michigan	9	1	2	6	26,653	22	36	0	0	0	6	6	1	0	0	9	10
Mississippi	8	4	0	4	55,334	14	39	1	0	0	3	4	1	0	0	4	5
Montana	13	8	0	5	74,616	24	31	1	0	0	5	6	1	0	0	7	8
Nebraska	9	2	0	7	52,544	40	53	1	0	0	5	6	2	0	0	26	28
New Mexico	37	15	11	11	146,902	85	136	0	0	1	9	10	3	0	1	13	17
Northwest	11	0	9	2	36,871	38	56	0	0	0	2	2	2	0	0	4	6
Southeast	26	15	2	9	110,031	47	80	0	0	1	7	8	1	0	1	9	11
North Dakota	5	4	0	1	40,262	19	12	0	0	0	1	1	1	0	0	6	7
Ohio	30	17	7	6	72,966	67	77	0	0	0	1	1	0	0	0	1	1
Oklahoma	172	105	5	‡62	599,805	409	494	6	0	0	18	24	9	2	0	48	59
Pennsylvania-New York	3	0	3	0	9,356	16	9	0	0	0	0	0	0	0	0	2	2
Texas	418	234	23	161	1,845,750	1,266	1,180	16	1	6	121	144	47	2	13	317	379
Southwest (1 & 4)	62	19	11	32	288,385	141	189	0	0	4	27	31	5	1	5	53	64
Gulf Coast (2 & 3)	48	15	7	26	320,507	143	180	3	0	2	17	22	4	0	6	40	50
East (5 & 6)	35	22	3	10	176,038	76	76	2	0	0	6	8	2	0	0	18	20
N. Central (7-B & 9)	142	83	1	58	443,452	454	403	10	0	0	38	48	28	0	2	137	167
West (7-C & 8)	100	69	0	31	491,125	353	278	1	0	0	31	32	7	0	0	55	62
Panhandle (10)	31	26	1	4	126,243	99	54	0	1	0	2	3	1	1	0	14	16
Utah	4	2	0	2	24,355	11	2	0	0	0	1	1	1	0	0	6	7
West Virginia	8	0	6	2	28,876	42	28	0	0	0	0	0	0	0	3	0	3
Wyoming	18	9	1	8	80,449	62	57	2	0	0	6	8	5	0	0	19	24
Miscellaneous (Ariz.)	3	0	1	2	14,061	10	9	0	0	1	2	3	0	0	1	3	4
Total U. S.	**1,082**	559	71	452	4,566,714	3,022	3,375	36	3	10	260	**309**	97	6	23	678	804
Total previous week	893	475	57	361	3,692,891			29	1	5	190	225	61	3	13	418	495
Total Jan. 21, 1956	1,182	629	105	448	4,680,461			31	4	8	197	240	94	19	22	663	798
Cumulative 1957	3,022	1,562	211	1,249	12,464,693												

Service wells included: *Fla., †3, ‡11.

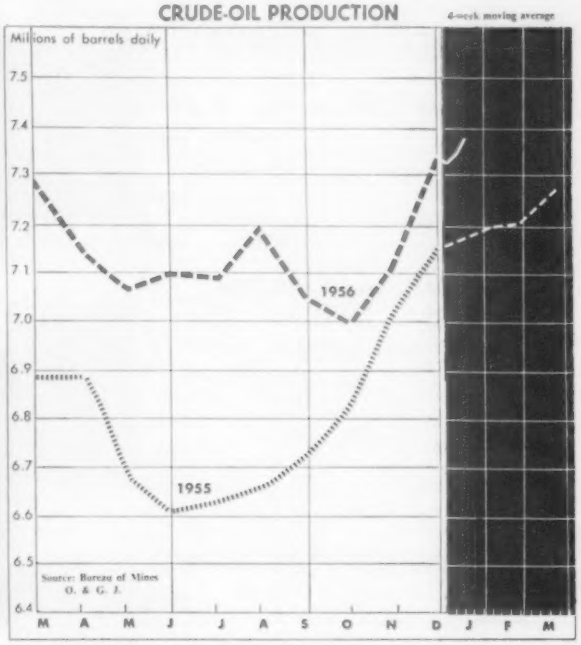
CRUDE IMPORTS



PRODUCT IMPORTS



CRUDE-OIL PRODUCTION

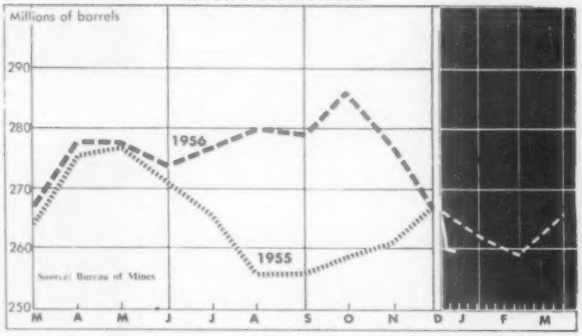


DAILY AVERAGE PRODUCTION FOR WEEK

	January 19, 1957			Jan. 12
	Crude oil	Lease condensate	Total	total
Alabama	11,500		11,500	11,500
Arkansas	80,040	320	80,360	80,350
California	944,500		944,500	945,800
Colorado	159,800		159,800	157,200
Eastern	51,000		51,000	50,000
Florida	1,300		1,300	1,300
Illinois	242,400		242,400	237,700
Indiana	32,400		32,400	33,600
Kansas	†340,150		†340,150	†324,000
Kentucky	48,500		48,500	48,500
Louisiana	898,200	80,800	979,000	979,200
North	128,200	2,800	131,000	131,200
South	770,000	78,000	848,000	848,000
Michigan	27,300		27,300	27,900
Mississippi	108,725	5,100	113,825	113,825
Montana	68,000		68,000	67,150
Nebraska	39,050		39,050	38,650
Nevada	100		100	100
New Mexico	245,510	4,850	250,360	250,350
North Dakota	38,300		38,300	39,100
Oklahoma	†623,300		†623,300	†597,200
Texas	3,023,000	56,150	3,079,150	3,079,150
Dist. 1	55,500	575	56,075	56,075
Dist. 2	145,500	8,750	154,250	154,250
Dist. 3	432,500	26,000	458,500	458,500
Dist. 4	230,000	6,700	236,700	236,700
Dist. 5	39,500	550	40,050	40,050
Dist. 6	130,000	6,300	136,300	136,300
East Texas Field	207,000		207,000	207,000
Dist. 7-B	162,000	75	162,075	162,075
Dist. 7-C	168,000	4,600	172,600	172,600
Dist. 8	1,143,000	1,450	1,144,450	1,144,450
Dist. 9	209,000	850	209,850	209,850
Dist. 10	101,000	300	101,300	101,300
Utah	10,280		10,280	9,000
Wyoming	296,000		296,000	293,000
Others	‡100		‡100	‡100
Total U. S.	7,289,455	147,220	**7,436,675**	7,384,675
Change from prev. week, up			**52,000**	
Canada	†563,200		†563,200	†484,400
Total U. S. production-Jan. 1-Jan. 19				140,727,150 bbl.
Same period last year (crude plus cond.)				*136,704,803 bbl.

*Includes 2,355,750 bbl. condensate. †Week ended previous Monday. ‡S. Dakota.

CRUDE-OIL STOCKS



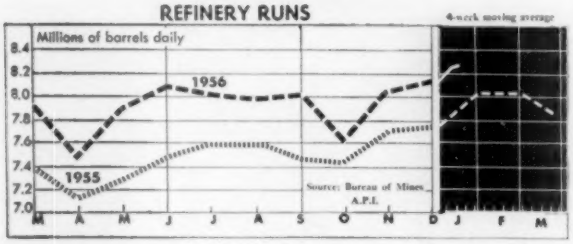
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

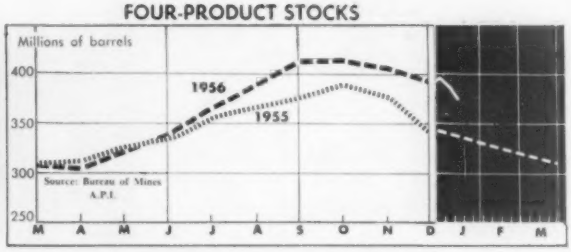
	1-12-57	1-5-57	1-14-56
Pennsylvania Grade	2,318	2,372	2,768
Other Appalachian	2,090	2,328	2,081
Illinois, Indiana, Michigan	11,321	10,837	9,217
Nebraska, North Dakota	2,222	2,220	1,987
Kansas	10,047	9,923	8,112
Oklahoma	22,885	22,825	21,816
Arkansas	2,728	2,864	2,003
Louisiana	19,198	18,635	15,717
North	2,853	3,083	2,664
South	16,345	15,552	13,053
Mississippi	2,656	2,761	3,105
New Mexico	7,717	7,827	7,933
Texas	113,973	114,969	123,437
East Texas proper	9,315	9,097	9,083
West Texas	53,381	53,340	58,062
Texas Gulf	21,684	21,998	24,934
Other Texas	29,593	30,534	31,358
Wyoming	16,751	16,028	15,674
Other Rocky Mountain	6,609	6,786	5,877
California	27,841	27,987	27,953
Foreign	†11,301	11,621	11,508
Total	259,657	259,983	259,188

*Bureau of Mines. †Includes 2,572,000 bbl. in California.

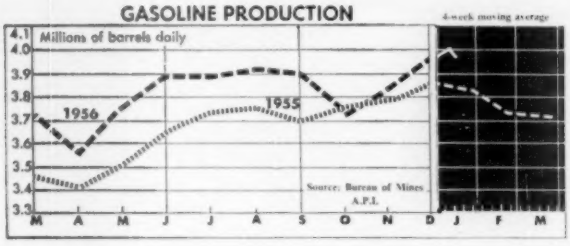
REFINERY RUNS



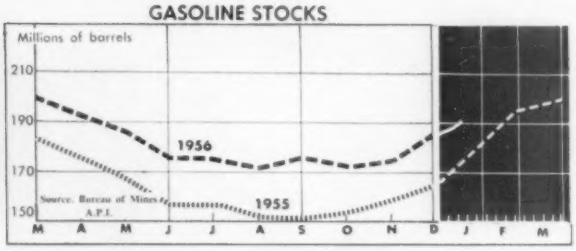
FOUR-PRODUCT STOCKS



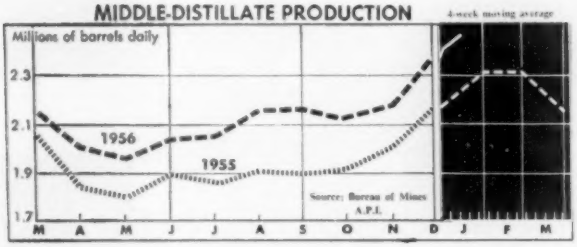
GASOLINE PRODUCTION



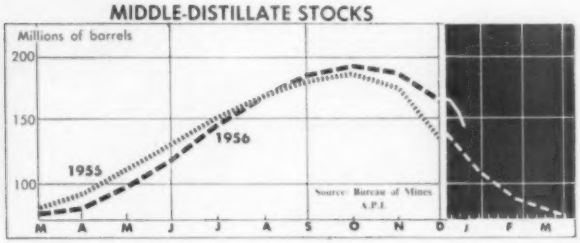
GASOLINE STOCKS



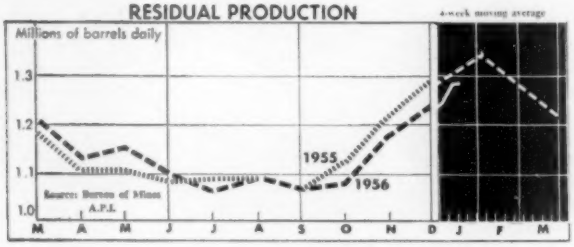
MIDDLE-DISTILLATE PRODUCTION



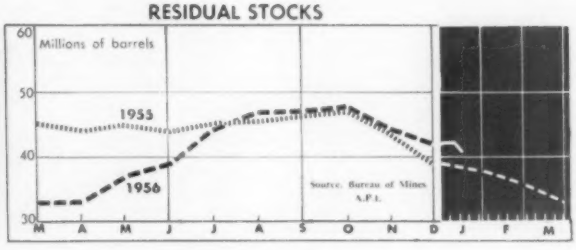
MIDDLE-DISTILLATE STOCKS



RESIDUAL PRODUCTION



RESIDUAL STOCKS



A.P.I. REFINERY REPORT, JANUARY 18, 1957

(Thousands of barrels)

District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, January 1956 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,202	482.3	38.0	383.1	213.7	41,367	11,078	42,186	10,278	1,132	483.0	41.6	300.7	259.6
Appalachian:														
District 1	107	42.6	6.9	24.7	10.7	4,969	530	2,749	467	105	44.7	5.6	27.1	11.5
District 2	111	50.9	8.3	18.9	17.3	3,018	519	933	266	104	52.3	7.9	18.4	17.3
Ind., Ill., Ky.	1,461	746.7	60.0	347.3	212.9	34,581	5,840	17,488	5,199	1,492	761.7	75.9	336.3	222.9
Minn., Wis., Dak.	91	38.1	5.1	23.4	9.3	7,138	1,256	6,650	254	87	41.4	9.9	18.5	10.6
Okla., Kans., Mo.	705	388.1	18.4	178.8	52.7	18,111	1,264	10,517	1,452	708	407.1	17.1	190.1	43.7
Inland Texas	280	200.7	12.7	49.0	25.1	7,840	552	1,931	1,861	278	192.5	8.3	53.5	26.8
Texas Gulf Coast	1,973	868.9	133.3	574.1	264.2	26,189	2,748	9,464	5,861	1,908	895.3	138.3	527.5	251.2
La. Gulf Coast	701	363.0	43.7	238.3	78.4	12,365	1,917	5,129	1,701	697	313.0	62.7	175.7	58.1
N. La. and Ark.	102	41.6	11.4	21.0	7.1	4,643	1,072	2,365	236	94	36.7	8.7	21.3	8.6
Rocky Mountain:														
New Mexico	26	13.3	0.6	4.6	3.6	509	10	108	66	22	11.5	0.7	3.3	3.2
Other Rocky Mt.	275	132.4	3.9	63.9	38.0	6,303	422	2,471	932	269	131.2	4.9	66.6	44.0
West Coast	1,086	503.9	10.8	193.0	341.7	24,340	334	12,433	12,436	1,127	472.5	3.6	184.1	386.8
Jan. 18, 1957	8,120	3,872.4	353.1	2,120.1	1,274.7	191,373	27,542	114,424	41,009	8,023	3,842.9	385.2	1,923.1	1,344.3
Jan. 11, 1957	8,272	3,953.9	374.6	2,056.1	1,331.3	189,243	29,795	122,983	42,727					
Jan. 20, 1956	7,952	3,795.1	375.3	1,939.3	1,331.0	175,785	22,711	94,610	39,012					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipe lines.

Crude-Oil and Refinery Prices at Representative U. S. and Foreign Points

REFINED-PRODUCT PRICES

Following quotations are for refinery products in cents per gallon moving in interstate shipments on Wednesday each week unless otherwise noted. Crude-oil prices are per barrel at the wells unless otherwise listed.

GASOLINE*

Mid-Continent (Group 3):	
Regular (88 octane)	12.00-12.25
Premium (96 octane)	13.75-14.00
Gulf Coast (cargoes for coastwise or export movements):	
Regular (90 octane)	11.25-11.50
Regular (92 octane)	11.50-11.75
Premium (97 octane)	13.25-13.50
Premium (98 octane)	13.50-14.00
California (rack):	
Regular (84 octane)	12.6-13.1
Premium (93 octane)	13.6-14.1
Premium (96 octane)	14.6-15.1
Caribbean area (cargoes):	
★ Regular (87 octane)	10.875
★ Premium (93 octane)	11.75

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

NATURAL GASOLINE*

Group 3:	
Grade 26-70	5.0
Breckenridge:	
Grade 26-70	4.5

*If 26-70 natural is considered as 100 per cent, prices for lower-vapor-pressure grades increase 2.5 per cent for each unit drop in Reid vapor pressure down to and including 16-lb. Prices for grades below 16-lb. may vary slightly by areas or plants.

KEROSINE AND DISTILLATE

Mid-Continent (Group 3):	
Kerosine 42-44	10.50-10.75
Diesel oil (58 d.i. and above)	10.125-10.375
Distillate No. 1	10.125-10.375
Distillate No. 2	9.50-9.75
Gulf Coast (cargoes):	
Kerosine 41-43	10.50-10.75
Distillate No. 2	10.00-10.25
New York Harbor (barges):	
Kerosine 41-43	12.25
Distillate No. 2	11.65
Diesel fuel, 48-52 d.i.	11.95
Caribbean area (cargoes):	
Distillate No. 2	10.0

WAX (LB.)

Oklahoma (Group 3):	
132-135 A.m.p. (semi-refined) in tank cars	6.50
New York (export):	
126-130 A.m.p. crude scale (solid in bags or barrels)	7.35

★Denotes change from previous week.

RESIDUAL FUEL (BBL.)

Mid-Continent (Group 3):	
Residual fuel (max. 1% S)	$2.45-2.70
Gulf Coast (cargoes):	
Bunker C fuel	$2.75-2.90
New York Harbor (barges):	
★ Bunker C fuel	$3.30-3.40
Caribbean (cargoes):	
Bunker C	$2.55
California (rack):	
Bunker C fuel, Los Angeles	$2.60-2.75

LUBRICATING OILS

Mid-Continent (Group 3):	
150-160 bright stock, solvent refined, 0-10 p.p., 95 v.i.	25.5
200 vis. neutral oil, solvent refined, 0-10 p.p., 95 v.i.	22.25
Pennsylvania Grade:	
★ 145-155 vis. at 210, bright stock, 8 color, 25 p.t.	27-28
★ 200 vis. neutral (180 at 100°), 25 p.t.	25-26

CRUDE-OIL PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.	Mid-Cont.*	Gulf Coast Tex.†	West Tex.† N.M.	Wyo. (sour)
14-14.9	$2.52				
15-15.9	2.56				$1.89
16-16.9	2.61				1.94
17-17.9	2.66				1.99
18-18.9	2.71				2.04
19-19.9	2.77				2.09
20-20.9	2.83	$2.75		$2.62	2.14
21-21.9	2.89	2.77		2.64	2.19
22-22.9	2.94	2.79		2.66	2.24
23-23.9	2.99	2.81	$3.44	2.68	2.29
24-24.9	3.04	2.83	3.46	2.70	2.34
25-25.9	3.08	2.85	3.48	2.72	2.39
26-26.9	3.13	2.87	3.50	2.74	2.44
27-27.9	3.17	2.89	3.52	2.76	2.49
28-28.9	3.21	2.91	3.54	2.78	2.54
28-29.9	3.25	2.93	3.56	2.80	2.59
30-30.9	3.29	2.95		2.82	2.63
31-31.9	3.33	2.97		2.84	2.67
32-32.9	3.37	2.99		2.86	2.71
33-33.9	3.41	3.01		2.88	2.75
34-34.9	3.45	3.03		2.90	2.79
35-35.9	3.49	3.05		2.92	2.83
36-36.9	3.53	3.07		2.94	2.87
37-37.9	3.57	3.09		2.96	2.89
38-38.9		3.11		2.98	2.91
39-39.9		3.13		3.00	2.93
40 and up		3.15		3.02	2.95

*Includes Oklahoma, most of Kansas, North Dakota, West Texas (sweet) and North Central Texas. †Low cold test Gulf Coast. ‡Sour.

Effective dates: California, January 17, 1957, east of California, January 3-January 10, 1957; Pennsylvania Grade, January 16, 1957.

Some crudes in North Central Texas and West Central Texas, are on the intermediate schedules.

FLAT PRICES

Louisiana:	
Bienville (distillate)	$3.05
Ville Platte	3.45
Texas:	
East Texas	3.25
Conroe	3.53
Van	3.13
Pennsylvania Grade:	
Bradford	4.88
Middle District	4.70
Southwest Pennsylvania	4.41
West Virginia	4.23
Buckeye Grade	4.23
Zanesville Grade	3.27
Illinois Basin	3.15
Canada:	
Leduc-Woodbend (flat prices D-2), D-3)	2.78
Redwater (Alta.) D-3	2.67
Smiley-Viking (Sask.)	2.44
Pembina	2.65

FOREIGN

Venezuela:	
Cumarebo, 48°-49.9°, Tucupido	3.75
San Joaquin, 40°-40.9°, Puerto La Cruz	3.37
Oficina, 35°-35.9°, Puerto La Cruz	3.05
Tia Juana medium, 26.5°-26.9°, Amuay*	2.55
Quiriquire, 16.5°-16.9°, Caripito	2.45
Lagunillas heavy, flat, Amuay or Las Piedras*	2.38
Bachaquero, 16.5°-16.9°, Las Piedras*	2.23

Prices for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

Middle East, Persian Gulf (cargoes, f.o.b. lifting port):	
Arabian, 36.0°-36.9°, Ras Tanura	$1.97
Iranian, 34.0°-34.9°, Bandar Mashur	1.91
Iranian, 34.0°-34.9°, Abadan	1.86
Iraq, 36.0°-36.9°, Fao	1.87
Kuwait, 31.0°-31.9°, Mina-al-Ahmadi	1.72
Qatar, 39.0°-39.9°, Umm Said	2.06
Middle East, E. Mediterranean:	
Arabian, 36.0°-36.9°, Sidon	2.69
Iraq, 36.0°-36.9°, Tripoli, Banias	2.69
Far East (cargoes, f.o.b. Lutong, Sarawak):	
Seria Light, 37°-38°	2.60

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★ Gulf-U.S.N.H., clean (USMC+115%)	$6.13
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Large Selection of Series 15, 30 Steel Valves, 1" to 8"

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3 Pacific ITB, 400 gpm—2,000' hd, 735 gpm—3,100' hd.
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GRADUATE Petroleum Engineer at least 4 years drilling production and reservoir experience with working knowledge subsurface interpretations wanted by independent producer for position Midland or Wichita Falls. Please submit full resume education qualifications and salary desired. All information confidential. Box J-875, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION SUPERINTENDENT—Contractor-Producer needs general superintendent production, principally gas, headquarters Guymon, Oklahoma. Engineering education preferred. Good opportunity for man with proper qualifications and not afraid of field work. Replies should include details of experience, education, and personal history, with expected salary. All replies confidential. Write Box J-893, The Oil and Gas Journal, Tulsa, Oklahoma.

ANDERSON-PRICHARD Oil Corporation has an opening in its Reservoir Engineering Section for a Junior Petroleum Engineer. Initial work location will be Oklahoma City. Applicants must have engineering degree; some field experience would be desirable. Please furnish a brief personal history including education and professional experience. All replies confidential. Address: Industrial Relations Department, Anderson-Prichard Oil Corporation, Liberty Bank Building, Oklahoma City, Oklahoma. Attention: Mr. D. F. Tver.

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Local Manager by independently owned natural gas transportation and distributing company. Prefer man between 40 and 50 years of age with general experience. Must know field gathering, transportation and distribution; must have initiative and general supervisory ability. Salary and opportunity commensurate with capability.

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Reply outlining personal history, work experience, and photo. All replies held strictly confidential.

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GAS ENGINEER—Leading independent oil company has opening for graduate engineer under 32 with general knowledge of construction, operation, and maintenance of gasoline plants, gathering systems, compressor stations, gas pipe lines and related facilities. Also knowledge of process engineering. Dallas, Texas, or Shreveport, Louisiana, location. Write full particulars as to personal background, education, experience, and salary requirements to P. O. Box 3053, Dallas, Texas, and enclose small photo.

GEOLOGIST — Independent producing company with expanding drilling activity in Mid-Continent area needs graduate geologist as chief of staff in non-administrative capacity. Several years major company experience desirable, prefer age 30 to 40. Splendid opportunity for man eager for a participation arrangement. Give full qualifications, experience, and photo with first letter. All replies held confidential. Box J-883, The Oil and Gas Journal, Tulsa, Oklahoma.

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BOX J-886,

THE OIL AND GAS JOURNAL,

TULSA, OKLAHOMA.

HELP WANTED

HELP WANTED

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Please furnish to our Personnel Manager a complete resumé of your experience, education, references and salary requirements. Also enclose a snapshot if available. One of our many benefits is a Profit Sharing and Retirement Plan.

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PROCESS ENGINEER with thorough technical training and minimum background of eight years refining and hydrocarbon processing experience with special emphasis on catalytic reforming and petrochemicals. Send complete record of education, experience, and minimum salary expected. Write Box J-867, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED—Attorney for Oklahoma independent producer and refiner. Must be under 50 and experienced in oil and gas practice. Must be able to handle general practice required by company, including insurance, credit risk, etc. Fine opportunity for right man. Apply. Box J-890, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED, YOUNG, cable tool driller for large water wells. Excellent yearly income with many benefits. Also experienced tool dressers. Enclose photograph with application. Egerer-Galloway Well Corporation, 1012 North Third Street, Milwaukee, Wisconsin.

REFINERY ENGINEER — Process engineering position with large independent company operating in Mid-Continent area. One to five years experience desired. State qualifications and give salary requirements. Box J-877, The Oil and Gas Journal, Tulsa, Oklahoma.

SEISMOGRAPH FIELD SUPERVISOR wanted by French geophysical corporation expanding its operations mostly in Europe and Africa. Thorough experience in all phases of seismic field techniques needed, with 8 - 10 years' field practice if possible. Preferably age 30 - 36. Furnish resume of education and experience. Box J-874, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED oil field supply credit man to headquarter in Tulsa. Must have had credit department experience with an oil field supply company in Oklahoma. Write in detail experience, qualifications, and salary requirements. Reply Box J-894, The Oil and Gas Journal, Tulsa, Oklahoma. Our employees know of this advertisement and all replies will be kept confidential.

SITUATIONS WANTED

GEOLOGIST: Desires responsible position with an independent or drilling Co. in Dallas. Seven years experience, sub-surface geology, drilling production, workover in N.W. and S.E. New Mexico, West and West Central Texas. Single, free to travel. Box J-882, The Oil and Gas Journal, Tulsa, Oklahoma.

CHIEF ACCOUNTANT, age 41, Certified Public Accountant, 15 years experience with oil companies and allied industries desires position with independent in southwest. Experienced at supervisory level with all phases of drilling and producing accounting including unitized operations and taxes, specializing in procedures, fiscal planning and forecasts. Have resigned present position effective March for sound reason. Expected salary $12,000 per annum.

Box J-897, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

MACHINE SHOP SUPERINTENDENT: Twenty-four years experience with major oil companies, administrative, heavy rig repair and maintenance welding, salvage and boiler shops. Finest of references. Available immediately for foreign or domestic position. Box J-885, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICIST: Ten years experience including seismic party chief, review, supervisory work, seeks permanent position with opportunity advancement. Good Spanish; work anywhere Western Hemisphere. Box J-879, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICIST: Ten years seis. experience, Texas, Oklahoma, Louisiana, desires challenging responsible situation. Excellent references. Box J-887, The Oil and Gas Journal, Tulsa, Oklahoma.

WOMAN, AGE 30, single, experienced in drilling and oil accounting, secretarial, and geological work, desires position in Amarillo, Texas. 500 Brown Building, Wichita, Kansas.

PRODUCTION FOREMAN: Seventeen years oil field experience. Presently employed in management capacity. Prefer Mid-Continent but other locations considered. Joe Charles. R.E.R., Pawhuska, Okla.

DISTRICT GEOPHYSICIST with major company desires position with smaller organization to supervise geophysical activities: correlate magnetic, gravity, and seismic results, and make independent interpretations of seismic data. Box J-868, The Oil and Gas Journal, Tulsa, Oklahoma.

CHIEF PILOT & PILOT—long experience as crew team—5 years Trans-Atlantic service—Desire to make change. Presently employed by nationally known corporation. Top references. Box J-900, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE Petroleum Engineer with three years experience all phases drilling and producing. Desire position with active independent any area U. S. or Canada. Currently supervising drilling and producing operations for independent group in three state area. Box J-895, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER, 15 years field, office, reservoir, gas utilization experience. Former chief gas engineer large state agency. Declined new contract gas advisor Saudi Arab Government account war danger. Desires position government or financial institution advisor or government representative of operator or consultant. Write Hall, 1103 Summit, Austin, Texas.

REGIONAL Exploration Manager: Geologist, 37, 15 years land and geological experience in successful oil exploration. Now employed with large independent company. Geological, land and administrative knowledge to plan, organize, and direct aggressive exploration program U. S. or Canada. Desire similar or advanced position with aggressive company. No location preference. Box J-896, The Oil and Gas Journal, Tulsa, Oklahoma.

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FOR SALE—To highest bidder: Oil, Gas and Mineral Lease, 135.76 acres, C. W. Chapman Survey, Southeast Grayson County, Texas along BIG FAULT LINE, expires March 15, 1961, carries $1.00 per acre annual rental. Hewlett A. Russell, Staley Bldg., Wichita Falls, Texas.

EASTERN KANSAS 700', 27 API, 160 acre stripper extension. 2 wells on pump. Box 393, Lawrence, Kansas.

480 ACRES in Coleman County, Texas, 180 acres in cultivation. Three producing oil and gas wells, 120 acres not under lease. Located in Novis field. Will sell land and mineral rights to settle estate. Contact C. B. Sprinkles, 422 W. Kennedy Ave., Coolidge, Arizona.

160 A. OIL LEASE, eastern Utah, center of activity, near gas. R. Barnsley, 950 Lincoln Ave., Palo Alto, Calif.

UTAH OIL LEASES on U. S. owned land in all counties where drilling active. 640 acre leases. 5 years and renewable 5 more. Free information. John L. Donahue, Empire Bldg., Denver 2, Colorado.

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FOR SALE: Fifty stripper oil wells, fourteen hundred feet deep, near major company water flood. Box J-880, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCING ROYALTIES. Over-riding royalties and Production carefully selected. We specialize in producing properties. Banks will accept for collateral. Write P. O. Box 3688, Tulsa.

PRODUCTION WANTED

WANTED Oil production 100 bbls. and up, any size, prefer Okla., N. M., Tex., Colo. or Kan. B. Thurston, 1427 Princeton NE, Albuquerque, N. M.

WANT TO BUY—Oil Properties, settled or semi-settled production. 100 to 5,000 barrels daily in Oklahoma and Kansas. Contact Morris Sitrin, 1215 First National Building, Tulsa, Oklahoma.

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WANTED oil and gas production, royalties, reasonably priced. Unlimited finances available. Prompt action. Send full details. Box 231, Scarsdale, N. Y.

WANT TO PURCHASE stripper production that can be reworked and stimulated with fracturing. Box J-899, The Oil and Gas Journal, Tulsa, Oklahoma.

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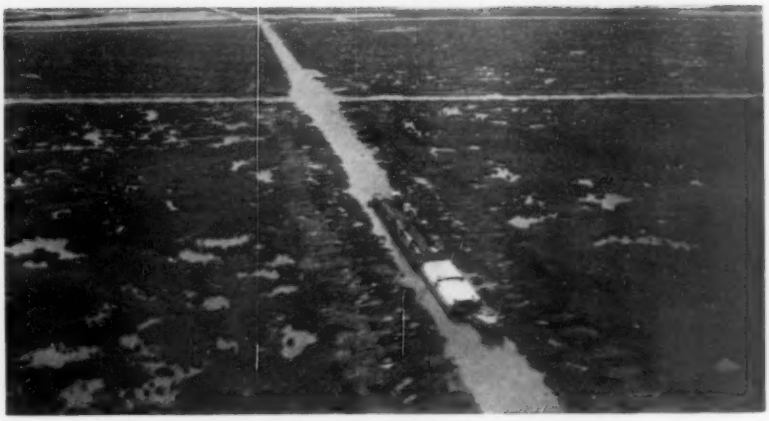
Leases with good production and excellent reserves. Producing royalty also needed.

P. O. Box 12103 Preston Station, Dallas, Texas.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Denver, Colorado. Notice is hereby given that 317.95 acres of land in two parcels within the known geologic structure of Williams Park Anticline Field, Routt County, Colorado, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre, at 2:00 P.M., M.S.T., March 15, 1957, when bids will be opened. The cost of advertising (publication) must be paid by the successful bidder. Details of the lease offering, how and where to submit bids, and forms may be obtained from the Bureau's Land Office, P. O. Box 1018, Denver, Colorado. George H. Woodhall, Manager.



Crude-Oil Line Laid Offshore

SHREVEPORT.—Interstate Oil Pipe Line Co. has completed a 16-mile, 12-in. crude line to serve leases 10 miles off the coast of Louisiana in Block 30.

The line crossed numerous canals, ditches, and bayous between Lake Washington field, where Interstate's system formerly terminated, and Pelican Island. Pelican Island is some 25 miles east of Grand Isle and about 6 miles southwest of Buras, La. Crude received at the Pelican Island station will be transported to Interstate's Anchorage terminal across the Mississippi River from Baton Rouge. It was formerly barged from the leases to Grand Isle, and piped from there to Anchorage.

Glaser Construction Co., Lafayette, La., laid the line from a series of lay barges. It was placed in a pipe trench in a 35-ft. flotation canal later closed at both ends of each section of marshland. The ditch across the center of the above photo contains a large-diameter gas line.

The pump station on Pelican Island, consisting of a creosoted piling-supported platform, was built by San Carline Construction Co., Berwick, La.

Gas Industry to Keep Expanding

NEARLY $1 billion will be spent on natural-gas pipeline construction this year, to set off a 10-year expansion spree for the natural-gas industry.

The American Gas Association predicts that the decade ending in 1965 will see an unprecedented growth in pipeline construction. Here is the transmission picture:

...Expenditures in 1957 will total $939,000,000, as compared with $615,000,000 in 1956. Healthy expenditures each year will add up to a total of $7,962,000,000 for the 1956-65 period (see table). This compares with $5,244,000,000 for the 1946-55 period.

...Mileage of transmission and gathering lines will increase from 204,800 in 1956 to 290,000 by 1965, an increase of 85,200 miles.

A.G.A.'s forecast by years illustrates the steady increase in pipeline construction: 1956, total miles of transmission lines 155,000, total miles of gathering lines 49,800; 1957, transmission 160,000, gathering 51,700; 1958, transmission 167,000, gathering 54,000; 1959, transmission 175,000, gathering 57,000; 1960, transmission 182,000, gathering 59,500; and 1965, transmission 218,000, gathering 72,000.

A.G.A. predicts that the industry will spend $2,540,000,000 in natural-gas production, and construction of larger production facilities during the next 10 years. This compares with $1,590,000,000 for the 1946-55 period.

Another $625,000,000 will be invested in enlarging underground storage facilities.

ESTIMATED CONSTRUCTION EXPENDITURES FOR THE NATURAL-GAS INDUSTRY—1956-65

(Millions)

	1956	1957	1958	1959	1960	1961-1965	Total forecast 1956-65	Actual total 1946-55
Transmission	615	939	590	785	818	4,215	7,962	5,244
Production and other storage	236	207	283	175	266	1,375	2,542	1,590
Underground storage	56	44	89	84	57	295	625	(*)
Total	907	1,190	962	1,044	1,141	5,885	11,129	6,834

*Included with Production and other storage.

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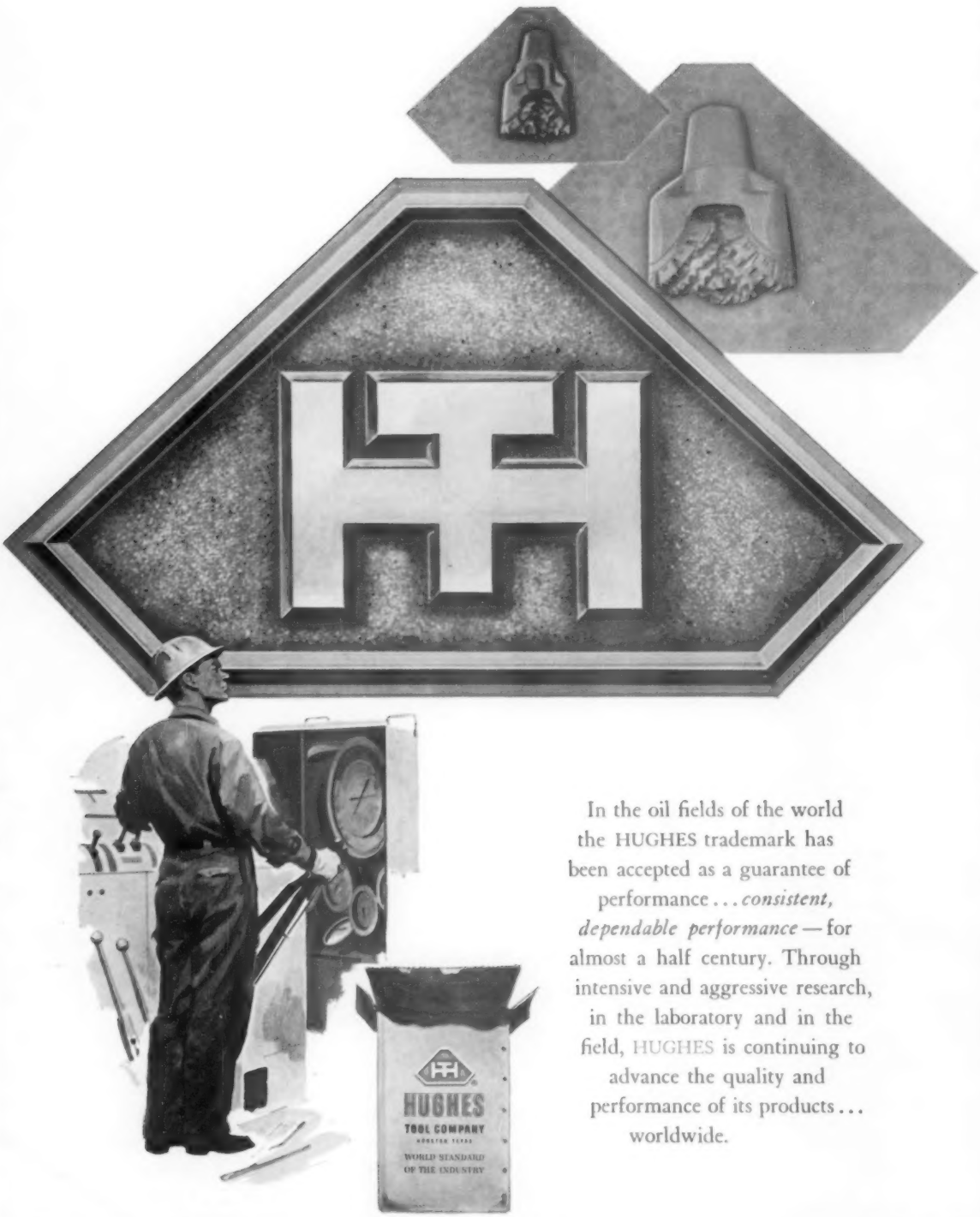

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